J. Pijar MIPA, Vol. 18 No. 6, November 2023: 976-980 ISSN 1907-1744 (Print)
DOI: 10.29303/jpm.v18i6.5973 ISSN 2460-1500 (Online)

QUANTITATIVE ANALYSIS OF BORAX IN SAPE CRACKERS IN SORO VILLAGE, LAMBU DISTRICT, BIMA REGENCY

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Received: October 26, 2023. Accepted: : November 24, 2023. Published: November 30, 2023

Abstract: Crackers are a popular snack product and have long been known by the people of Indonesia as a complement to meals that are often not left behind; without these snacks, people often feel something is missing in their diet. Manufacturers often misuse sodium tetraborate as white crystals with the chemical formula Na2B4O7. This quantitative research uses an experimental method using four samples of sape crackers. This research aims to determine the sape crackers in Soro village, Lambu subdistrict, Bima regency. Quantitative analysis of borax in the sape cracker sample was 9.67 µg/mL in sample A, 12.17 µg/mL in B sample, 13.89 µg/mL in the C sample, and 62.01 µg/mL in the D sample. This study concludes that the sape crackers produced in Soro Village, Lambu District, Bima Regency, from the four samples studied, were all positive for containing borax. It is hoped that producers can use permitted food additives such as Sodium Tripolyphosphate (STPP).

Keywords: *Sape Crackers, Borax, UV-Vis Spectrophotometry*

INTRODUCTION

Humans, as living things, need food to carry out life because this food is a source of energy for living things, especially humans, in carrying out activities. Food is the most essential basic need for humans. Food must also have sufficient nutritional value and not contain harmful substances so as not to cause health problems for humans[1].

Various processed food and beverage products with attractive shapes, colours, and flavours are now straightforward to obtain. The difference is significant compared to past societies that processed food and drinks with simple and traditional tools.[2] Improving the quality of human life is not only through improving education and science but also determined by food quality. In food management, efforts are always made to produce food products that are preferred and of good quality [3].

The implementation of food safety for food production activities or processes, as stated in Law No. 18 of 2012 concerning food, explained that food production must be carried out through food sanitation, regulation of food additives, regulation of genetically modified food products and food irritation, determination of food packaging standards, provision of food safety and food quality guarantees, and halal product guarantees for those required. In carrying out food production, food business actors must meet various conditions regarding food production activities or processes so that they are not at risk of harming or endangering human health [4].

Borax is also categorized into prohibited additives based on Permenkes RI No. 033 of 2012 concerning Food Additives [5]. Borax is a compound named sodium tetrabonate in the form of soft crystals. When dissolved in water, borax decomposes into sodium hydroxide and boric acid. Borax is widely used as an additive to some food products such as meatballs, schoolchildren's snacks, tofu, crackers, etc [6]. The addition of borax aims to provide a dense texture, increase chewiness and crispiness, and provide a savory taste and is long-lasting, especially in foods that contain starch. And these foods can be easily found in traditional markets and supermarkets. Long-term consumption of borax has very harmful effects, such as circular depression, cyanosis, seizures, and coma. Some animal studies report borax with a concentration of 6,700 ppm can reduce sperm quantity and testicular atrophy, resulting in infertility in men. In addition, it can also cause disorders of the central nervous system, cutaneous abnormalities and growth retardation and toxicity in the embryo or fetus [7].

Borax is widely used as an additive to crackers that aims to improve texture, making it fluffy when fried, tender, and crispy. Adding borax to the diet has a harmful effect if it accumulates in the human body. Symptoms of acute borax poisoning in humans include nausea, vomiting, diarrhea, patches on the skin, decreased body temperature, anxiety, and even death. Chronic poisoning can cause fever, anuria, kidney damage, depression, and confusion [8].

Crackers are divided into various types, both raw materials and additives as flavor givers; the main ingredients are made from cassava, rice flour, wheat flour, or starch. Additional elements contained in crackers are dyes, chewers, and preservatives. Additives used to maintain food quality, such as preservatives, are a relatively simple and inexpensive technique. Everyone who

processes food for distribution is prohibited from using chemicals banned from being used as food additives. Sanctions are administrative sanctions, imprisonment for five years, or a maximum fine of 10 billion rupiah [9].

One of the crackers that people in Bima Regency/City much love is Sape crackers. This type of cracker has a distinctive, delicious taste and is one of the typical souvenirs of the Sape-Lambu District, Bima Regency. From a preliminary study conducted with one of the sape cracker producers in Soro Village, Lambu District, these crackers are produced on a residential, industrial scale with production time every day because the Bima community very widely consumes these crackers, especially the people of Sape-Lambu District, the ingredients used in making sape crackers are water, food developers, flavorings and wheat flour. Sape crackers are suspected of containing borax because they are durable, crispy, and not easily crushed. One of the characteristics of foods containing borax is that they are more durable and not infested by flies because borax is also toxic to these flies. Soro Village is one of the most Sape Cracker Producing Villages in the Sape-Lambu District; Soro Village consists of 4 Hamlets: Oi Wontu Hamlet, Panta Paju Hamlet, Moti Hamlet, and Oi Ncinggi Hamlet. Of the four hamlets, only 3 produce Sape Crackers: Panta Paju Hamlet, Oi Wontu Hamlet, and *Oi ncinggi* Hamlet. In this study, the author used a quantitative approach with the UV-Vis spectrophotometry method to determine whether sape crackers contain borax. The research aims to assess borax in Sape crakers.

Based on the above background, the author is interested in conducting research entitled "Quantitative Analysis of Borax Content in Sape Crackers in Soro Village, Lambu District, Bima Regency."

RESEARCH METHODS

This research is quantitative research with experimental methods. Quantitative research methods can be interpreted as research methods based on the philosophy of positivism, used to examine specific populations or samples, data collection using research instruments, and data analysis is cumulative/statistical.

Cracker samples were taken in Soro Village, Lambu District, Bima Regency, then to the Mataram Environmental Engineering College Laboratory for examination. The population in this study is Sape Crackers taken in Soro Village, Lambu District, which is four obtained from sape cracker producers.

The observation method used in this study is a quantitative test using UV-Vis spectrophotometry, which is one of the test methods to determine whether there is borax in food and the level of borax in the Sape Crackers. Tools used in this research include scales, porcelain dishes, Erlenmeyer, ovens, measuring cups, flasks, vortex mixers, racks and test tubes, Hot plates, and glass funnels. UV-Vis Measuring Pipettes and Spectrophotometry. The materials used in this study include *Sape* crackers, Aquades, NaOH 10%, curcumin solution 0.125%, ethanol, concentrated acid and acetic acid, borax standard solution, tissue, and filter paper [10].

RESEARCH RESULTS AND DISCUSSION

Based on the results of the examination of Borax levels in sape crackers, it was found that all samples of crackers were positive for borax (Table 1).

The average value obtained from laboratory measurements is calculated using quantitative methods to determine the absorbance (Table 2).

Table 1. Results of Laboratory Examination of Borax Content in Sape Crackers

No	Parameter	Average	Method
1	Samples of crackers A	0.076	UV Vis Spectrophotometer
2	Samples of crackers B	0.092	UV Vis Spectrophotometer
3	Samples of crackers C	0.103	UV Vis Spectrophotometer
4	Samples of crackers D	0.411	UV Vis Spectrophotometer

Table 2. Sample Quantitative Examination Results

No	Samples of crackers	Absorbance	Borax Levels in Samples (µg/mL)
1	Samples of crackers A	0,076	9,67
2	Samples of crackers B	0,092	12,17
3	Samples of crackers C	0,103	13,89
4	Samples of crackers D	0,411	62,01

Crackers are a popular dry food product that has long been known to the people of Indonesia. The consumption of crackers is usually not as a main meal but as a small meal, snack, or as a

complement to dishes mainly consumed in small quantities. Crackers generally circulating in the market are only made from tapioca flour seasoned and fried [6].

There are two types of crackers known in the community, namely crackers with vegetable raw materials (Such as cassava crackers, onion crackers, puli crackers, *tempeyek*, and *rengginang* (both of these snacks are traditional snacks) and crackers with added animal food (such as shrimp and fish crackers) [11].

The most significant component of crackers is starch, so crackers have a low protein content. It is necessary to make food diversification efforts to increase the nutritional content of crackers, especially protein, and Fe, considering that the body needs these two substances [12].

Some types of starch that can be used in making crackers are tapioca flour, sago flour, wheat flour, or rice. In society, cracker processing mainly uses tapioca flour derived from cassava. In addition to tapioca flour, sago flour can make skipjack fish crackers. Starch is the most significant component in raw sago crackers, which is 85.56% with a moisture content of 9.44% wet weight because the sago flour used has a reasonably high starch content. Sago starch has a very high carbohydrate content of about 98% dry weight. Sago starch granules have a high expandability of 97%; this is necessary at the cracker development stage. So, sago flour is a raw material for crackers with a high potential to expand at 97% [13].

In Law Number 18 of 2012 concerning food, it is stated that the government is obliged to ensure the realization of the implementation of food safety, one of which is carried out through regulating the use of food additives (BTP) to keep the food consumed by the community safe and hygienic. According to Government Regulation Number 28 of 2004, food additives (BTP) are ingredients added to food to affect the nature or form of food or products [14].

BTP is divided into BTP, which is allowed, and BTP, which is prohibited/dangerous to use. BTP-permitted use must be given within the limits where the consumer does not become poisoned by consuming additional substances, known as threshold use. As for the prohibited BTP category, use with the slightest dose is still banned [15]. If the body is exposed to borax continuously or consumed in very large quantities, this can cause various more severe health problems, such as Seizures and nervous disorders. Infertility or fertility disorders. Cancer, for example, liver cancer and colon cancer.

Currently, there are many snack foods that, in the processing process, use food additives and chemicals without a good calculation process. These food additives are sweeteners, flavourings, preservatives, antioxidants, aromas, thickeners, nutrients, dyes, and others [16].

Four types of hazardous materials are prohibited from being used for food, such as formalin (a preservative used for corpses), borax (a suppressor containing the heavy metal boron), Rhodamine B (red dye in textiles), and methanyl yellow (a yellow dye in fabrics) [17].

A preservative that is often used is borax. Borax is a crystalline compound, white in colour, odourless, and stable at average pressure temperatures. It is highly toxic, so food regulations do not allow the use of borax in food. Borax is used in the glass industry, porcelain, cleaning tools, pesticide agents, and other preservatives. In addition, borax is also used in medicine for antiseptics, ointments, and eyewashes. Some research reports reported borax has been used as an additive to foods such as meatballs, noodles, rice cakes, crackers, and tofu [18].

Based on the results of research conducted quantitatively using the UV-Vis Spectrophotometry method, testing of borax content in sape crackers taken in Soro Village, Lambu District, Bima Regency obtained results for the average absorbance value of sample A 0.076, sample B 0.092, sample C 0.103 and sample D 0.411 [19].

Based on the results of research on processed crackers in Heram District, Jayapura City, using the UV-Vis Spectrophotometry measurement method, from 5 cracker samples tested, three samples were positive for borax, namely in sample B of 4.543 µg / mL, sample C of 2.120 µg / mL and in sample E of 0.033 µg / mL, obtained from the linear equation $y = 0.5143x + 0.1233$ with $R2 = 0.9988$ [20].

Juwita, A. et al. tested the borax content of several raw crackers from the Jambi City Traditional Market; from 10 plain crackers tested, there was one positive rice cracker sample with a 139.23 µg / mL content. While the results of the examination conducted by the Head of the North Sulawesi Center for Drug and Food Control (BBPOM) on food ingredients in Manado City in 2017, many meatball traders often used borax. Meanwhile, BPOM North Sulawesi and the Health Office again found food containing hazardous ingredients (borax) in Bersehati Market, as many as 12 positive samples containing borax, and in Pinasungkulan Market Karombasan found seven positive samples containing borax [21].

The borax content in sape cracker samples found in Soro Village, Lambu District, needs more attention for consumers considering borax is a dangerous preservative [22]. The use of borax in food can cause several problems and diseases for the human body if ingested and accumulated into the human body. According to the Regulation of the Minister of Health of the Republic of Indonesia Number 033 of 2012 concerning Food Additives,

borax is one of the types of Food Additives prohibited from being used in food products [23]. The harmful effects of consuming borax can cause gastrointestinal irritation, which is characterized by headaches, dizziness, vomiting, nausea, and diarrhea. Further symptoms are characterized by weakness, kidney damage, and even shock and death when ingested 5-10g/kg body weight [24].

CONCLUSION

The quantitative analysis of borax content in sape crackers using the UV-Vis Spectrophotometry method on four sape cracker samples was positive for borax. The level of borax content contained in sape cracker samples in Soro Village, Lambu District, Bima Regency, namely sample A of 9.67 µg/mL, sample B of 12.17 µg/mL, sample C of 13.89 µg/mL, and sample D of 62.01 µg/mL. The levels of borax content obtained are very dangerous for human health, ranging from mild symptoms such as nausea, vomiting, dizziness, diarrhea up to further symptoms such as weakness, kidney damage, even shock and death when ingested 5-10 g / kg body weight It is expected for producers to use food additives (BTP) that are not harmful to health. It is hoped that producers can use permitted food additives such as Sodium Tripolyphosphate (STPP).

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