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A Case Study: Situation of Borax Contamination in Meat Ball in Wattana District, Bangkok, Thailand

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Abstract:

Background: Borax, a substance commonly used as a food additive and preservative, has faced safety concerns due to its potential health hazards from consumption. Although the use of Borax is banned in many countries, it is still being used illegally in the Thai food industry, posing consumer risks. In Thailand, borax contamination is a significant issue due to the inadequate monitoring in street food markets. Research in Bangkok's street food market aims to protect public health by addressing unauthorized borax use and promoting food choices based on taste preferences rather than health considerations.

Objective: To determine the borax in sausage and meatball products

Methods: This study detected borax in sausage and meatball products sold in Wattana district in Bangkok, which the test kit used in the lab experiment was from Pharmacy Organization Thailand. 40 samples were randomly selected from supermarket and flea market.

Result: From a total of 40 samples of sausages and meatballs, it was found that Borax was present in 4 samples (10.00%). Among the samples where Borax was detected, all were samples from the street food markets. These staples consisted of 2 samples of Pork Ball, 2 samples of Chicken Ball and 1 sample of Chicken Sausage.

Conclusion: Out of all samples testing for the presence of Borax, the substance was detected in all samples from the street food market (15.38%) of the totals.

Keywords **—borax, sausage, meat ball**

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Introduction

Over the past few years, there has been a growing apprehension regarding the safety of specific additives used in food. Among these substances is borax, also referred to as sodium borate, which has faced considerable scrutiny. Boron, sodium, oxygen, and water form this naturally-occurring mineral compound called borax. It finds numerous applications ranging from household cleaning agents and pesticides to being utilized as a food ingredient.[1]

Borax has been utilized as a food preservative for an extended period in the realm of food due to its ability to impede microorganism growth and enhance the shelf life of food items. It was once employed in traditional recipes and culinary practices. However, there is ongoing debate surrounding its use as a food additive owing to potential health hazards that may arise from excessive consumption.[2] Despite being banned as a food preservative in numerous countries, some manufacturers still employ this additive for preserving their products. This improper utilization of borax as a food additive has been observed across various foods, including skewered meatballs and cilok, thereby raising concerns about the detrimental impact it may have on human well-being.

The presence of borax in food presents a concerning issue due to its toxic properties. Multiple Studies have demonstrated that borax can be detrimental to cells and poses a potential risk to human health for individuals who consume food containing this substance.[3] Engaging in excessive consumption of borax, particularly through the intake of food products, can result in severe toxicity effects.

The issue of Borax contamination in food continues to be a significant concern in several regions across Thailand. Different types of food pose different levels of risk, with ground meat being the most susceptible at 43.3% followed by certain snacks and desserts.[4] The primary cause behind this contamination is primarily attributed to the insufficient control and monitoring practices observed within fresh markets.

Although borax is a regulated substance that should not be used for food purposes, it continues to be illicitly employed in the food industry as an additive to improve texture, appearance, and preservation. This unauthorized use of borax poses significant risks to consumers and raises concerns regarding their well-being.[5]

The exponential expansion of the food industry in Bangkok, which serves as a central hub for distribution, coupled with the rise in culinary establishments resulting from economic and social transformations, have presented unique difficulties to ensure efficient oversight. Elements such as online food delivery services, mobile food vendors, and the prevalence of migrant workers lacking adequate understanding regarding proper food sanitation practices can significantly influence both hygiene standards and overall safety measures pertaining to consumable goods.[6]

Nowadays, Thai people's eating behaviors are divided into two main tastes: “spicy” and “sweet.” People of all ages love eating different styles of food based on different factors such as the working-age group tend to buy food that is cheaper and more convenient, while teenagers focus more on the attractiveness and appearance. On the other hand, elderly like to eat more veggies. As one can see, Thai people’s food choices are primarily based on their preferences rather than considering health factors.

Since, Wattana district is located at the center of Bangkok, numerous people flocked into the area whether for living, work, or study. As people come day in and day out, the number of markets and stores increase as well. To make food look more attractive, chemicals are being added and one of the examples is Borax. Consuming Borax could lead to adverse effects on the consumers; therefore research aims to contribute to consumer protection and public health, empowering individuals to make informed choices about the food they consume.

Objective of the study

1. To determine the borax in sausage and meatball products
2. To study the presence of Borax contaminating food products, categorized by the sources of purchase

Study Methods

This study determined borax in sausage and meatball products sold in Wattana district in Bangkok, which the test kit used in the lab experiment was from Pharmacy Organization Thailand.[7]

Sampling

The samples that were used in this lab experiment were from street food sellers, convenient stores and supermarkets in Bangkok, Thailand. There were 40 samples in total, consisting of 14 samples from convenience stores and supermarkets and 26 samples from street food sellers.Convenient sampling methods were used to select sausage products. Types of sausage sample brought and sources were displayed in Table 1.

Table 1. Demonstrated the sample type and the sources of purchased

No.	Sample Type	Supermarket	Street food
1	Pork Ball	2	4
2	Chicken Ball	2	4
3	fish/shrimp balls	2	4
4	Meatball	2	4
5	Pork Sausage	2	4
6	Chicken Sausage	2	4
7	Fermented Pork Sausage	2	2
	Totals	14	26

Procedure

1. Label the food samples including five sausages.
2. Cut food samples into pieces size 2mm x 2mm.
3. Scoop 1 teaspoon of sample into a glass beaker.
4. Mix sample with solution thoroughly.
5. Dip the strip paper into solution.
6. Leave it dry on the ceramic plate.
7. Wait until the strip paper dries for around 20 minutes.
8. Observe and record the dried strip color Sampling

Instrument and tools

1) Plastic cup 1 piece
2) Dropper 1 piece
3) Plastic spoon 1 piece
4) Borax Reagent 1 bottle
5) Turmeric Paper 1 bottle

Data collection

1) Buy samples from street, convenient stores, supermarket and stall
2) Store food sample in the refrigerator and keep it for one day
3) Take food sample out of the refrigerator
4) Bring food sample to laboratory test

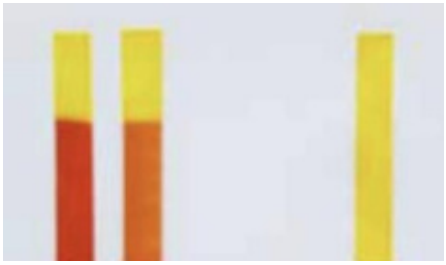
Data Analysis

Descriptive statistics; frequency, percentage, mean and standard deviation were used to analyze data collected.

Data Interpretation

1. After the turmeric paper was soaked in the solution, place it on the ceramic plate and let the paper dry for 10 minutes.

2. if the turmeric paper turned into a color of orange to red, it can be concluded that the sample contained borax



Positive Negative

Fig. 1 The results of borax detection were positive and negative, respectively.

Results

Out of 40 samples testing for the presence of Borax, the substance was detected in 4 samples (10.00%) of the totals. Among the samples where Borax was found, 2 samples of Pork Ball (33.33%), 1 sample of Chicken Ball (16.67%) and 1 sample of Chicken Sausage (16.67%). The result is shown on Table2.

Table2. Demonstrated the result of tested for the presence of Borax

No.	Sample Type	Total	Positive n (%)
1	Pork Ball	6	2 (33.33)
2	Chicken Ball	6	1 (16.67)
3	fish/shrimp balls	6	0 (0.00)
4	Meatball	6	0 (0.00)
5	Pork Sausage	6	0 (0.00)
6	Chicken Sausage	6	1 (16.67)
7	Fermented Pork Sausage	4	0 (0.00)
	Totals	40	4 (10.00)

The result of the Borax examination, categorized by the purchasing sources, revealed that out of 26 samples bought from street foods, Borax was found in 4 of the samples (15.38%). This includes 2 samples of Pork Ball (50.00%), 1 sample of Chicken Ball (25.00%) and 1 sample of Chicken Sausage (25.00%). In contrast, none of the samples from the supermarket show any presence of Borax. The result is shown on Table3.

Table 3. Demonstrated the result of tested for the presence of Borax categorized by the source of purchased

No.	Sample Type	Total	Supermarket		Street food	
			No. of Sample n	Positive n (%)	No. of Sample n	Positive n (%)
1	Pork Ball	6	2	0 (0.00)	4	2 (50.00)
2	Chicken Ball	6	2	0 (0.00)	4	1 (25.00)
3	Fish/shrimp balls	6	2	0 (0.00)	4	0 (0.00)
4	Meatball	6	2	0 (0.00)	4	0 (0.00)
5	Pork Sausage	6	2	0 (0.00)	4	0 (0.00)
6	Chicken Sausage	6	2	0 (0.00)	4	1 (25.00)
7	Fermented Pork Sausage	4	2	0 (0.00)	2	0 (0.00)
	Totals	40	14	0 (0.00)	26	4 (15.38)

Discussion

Borax was found in 4 samples from the flea market, this may be because the manufacturers of sausages and meatballs believe that adding Borax can improve its taste, making it more appealing to the consumer without realizing the potential health risks during consumption.[8] In addition to the products selling at the street food markets, there are various qualities good. However, there is no quality inspection process, allowing vendors to sell all types of products at the street food market, including sausages and meatballs that are not standard-based. Therefore, there is a chance of discovering Borax contaminating food.

The findings of this study align with the results of research by PongzessPupongbunyarit and colleagues,[9] which investigated Borax contamination in sausage samples sold in supermarkets and stalls in Bangkok, Thailand, in 2022. They found that 62.07% of the examined samples contained Borax. Additionally, the results of this study are consistent with the study by NatchayaAiadkaeo and colleagues,[10] who examined meatball samples sold in the Bangkok area of Thailand in 2022 and found that 60.47% of the tested samples contained Borax.

Furthermore, the findings of this study align with the research conducted by MalineeChinnanont,[11] who investigated Borax in meatball samples in the Trang province of Thailand. This study discovered that all tested samples exceeded the standard levels of Botox, reaching dangerous levels if consumed.

The results of this study differ from those of a study conducted to detect Borax in food samples within the Chiangmai University dormitory area. In the study, a total of 225 samples were examined, but no Borax was found.[12] This could be because of the quality control of food available in the university area where food vendors select the quality of ingredients for selling

Conclusion

From a total of 40 samples of sausages and meatballs, it was found that Borax was present in 4 samples (10.00%). Among the samples where Borax was detected, all were samples from the street food markets. These staples consisted of 2 samples of Pork Ball, 2 samples of Chicken Ball and 1 sample of Chicken Sausage.

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