

A Case study: An Investigation of Borax in Meatball Products Sold in Bangkok, Thailand

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Abstract

Background: Borax was used in a variety of processed food products. Excessive levels of Borax in food can cause a lot of health effects. Processed foods have been become popular due to social factors and lifestyle changes. **Objective:** To determine the Borax in samples of meatball products sold to consumers. **Method:** Borax contamination in samples of sausage products were determined by using Borax test kit produced by Pharmacy Organization Thailand. **Result:** Out of 43 meatball samples, consisting of chicken, fish, meat, mixed, pork and shrimp, Borax was detected in 26 samples, representing 60.47%, the highest percentage of the first 3 samples of 10 fish ball samples, Borax was detected in 7 samples, representing 70%, followed by 75% of the 8 meatball samples, and 75% of the 6 samples found Borax and a total of 16 pork ball samples found borax in 10 samples, representing 62.50%. **Conclusion:** Borax was detected in meatball products sold to consumers 62.50% of total samples studied.

Keyword: food safety, Borax, meatball

Background

Nowadays, the food choices of working age people have changed by many reasons such as; the environment, residence, social and economic factors, which affect the way of life and food selection. Today's society is in a state of urgency so people do not have time to focus on choosing healthy food properly¹. Therefore, Processed food is an alternative of food consumption. Processed food is prepared food, seasoning and smell, shape or pack modification or contained in different packages to make it easier to consume and reserve. Processed food in our daily life is including soft drinks, French fries, bacon, ham, especially "meatball". It's a product made from meat, spices, condiments and other additives and mix thoroughly until a homogeneous texture. Then create it into the desired shape by blanching or boiling it to be finely ground meat product, a kind of emulsion. It is obtained by chopping until the original structure of the meat is not visible². Meatballs consist of flour, meat and fat. Apart from the three main components mentioned above, Meatballs also have a plus called borax that may cause harm to our bodies as well³. Borax It is an inorganic substance with the chemical name "sodium tetraborate", commonly known as crispy powder or borax is a white fine powder, odorless, water soluble. It is a substance that is used in the industries such as glass making to resistant heat or used as a binder in gold welding, used as a pesticide ingredient for plating and coating of metal. However, there are some smugglers to add in food to make food crispy, stable for a long time, is not easily rotten. Industrially, Borax is used extensively in the manufacture of glass, enameled containers, and metal plating to make the material more resistant to heat, used in of products' formulations such as insecticides and fungicides for wood protection and used as a binder for gold, etc. From the mentioned features of Borax, it's shown obviously that we should not add borax in food under any circumstances.

Because borax is the substance that is damaging to health. According to the Notification of the Ministry of Public Health No. 151 (BE 2536) that borax is an object that is strictly prohibited in food because ingesting borax can cause toxin in the body. Consuming large amount of borax powder may cause irritation or severe gastrointestinal

harm. Borax is also classified as a toxic substance to the cells in the body. If it accumulates in any part of the body's cells, it will be absorbed into various organs (mostly in the kidney cone) and can cause inflammation. For example, if too much borax accumulates in the kidney cone, it will cause kidney inflammation or the kidneys will be disabled finally. Even you absorb this substance or have food contaminated with borax powder on a regular basis, it can also harm the kidneys. For children who obtain it more than 5 grams of borax (in a single dose) can be fatal. For adults who ingest more than 15 grams of this substance can be fatal likewise⁴. For this reason, the objective of this experiment is to determine the Borax in meatballs that were sold to consumers in Bangkok and Nakhon Sri Thammarat Province and to find percentage of detected Borax in meatball.

Objective of the study

1. The objective of this experiment is to determine the Borax in meatballs that were sold to consumers in Bangkok and Nakhon Sri Thammarat Province.
2. To find the percentage of detected Borax in meatball.

Study Methods

This study determined the Borax in meatball sold in supermarket and on street in Bangkok, Nakhon Rachasima and Nakhon Sri Thammarat by using the Borax Test Kit produced by the Government Pharmaceutical Organization, Thailand.

Procedure

Label the food samples including 5 sausages.

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

Population and Sampling

The samples that were used in this study are the meatball products that were sold in shopping centers and hawker stalls in Bangkok, Nakhon Rachasima and Nakhon Sri Thammarat. It can be categorized from the main ingredients into different 6 categories including, chicken ball with 2 samples, fish ball with 10 samples, meat ball with 8 samples, pork ball with 16 samples, shrimp ball with 4 samples, and mixed ball with 3 samples. The total number of samples was 43 samples.

Type of Meat ball	Total No. of Sample
Chicken	2
Fish	10

Meat	8
Mixed	3
Pork	16
Shrimp	4
Total	43

Materials

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

Data Collection

Group members were assigned to buy all samples 1 day before the experiment day, including pork ball, meat ball, chicken ball and fish ball. These samples were brought from a shopping centre and hawker stall.

Data Analysis

Descriptive statistics; frequency, %age, mean and standard deviation were used to analyse collected data. The interpretation is as following;

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 colour of orange to red, it can be concluded that the sample contained Borax.



Figure 1 Table comparing the amount of borax

Result

Out of the 43 meatball samples. In the total of 8 beef meatball samples, Borax was found in 6 meatball samples, representing 75%. In the total of 10 fish ball samples, Borax was detected in 7 samples, representing 70 %. In the total of 16 pork ball samples, Borax was found in 10 samples, representing 62.5%. In the total of 2 chicken ball samples, Borax was found in 1 sample, representing 50 %. In the total of 3 mixed ball samples, Borax was found in 1 sample, representing 33.33 %. In the total of 4 shrimp ball samples, Borax was found in 1 sample, representing 25%.

Table No. 1 The table represents the number of samples and %ages of Borax by type of meatballs (n=43)

Types	No. of Sample	Positive	Negative	% Of detected Borax
Chicken	2	1	1	50.00%
Fish	10	7	3	70.00%
Meat	8	6	2	75.00%
Mixed	3	1	2	33.33%
Pork	16	10	6	62.50%
Shrimp	4	1	3	25.00%
Total	43	26	17	60.47%

Discussion

Borax was detected in 43 samples of meatballs purchased from department stores and hawker stalls in Bangkok. All samples consisted of meatballs, chicken, fish, meat, mixed meat, pork and shrimp. Borax was detected in 26 samples, representing 60.47%. Borax was detected the top 3 percentages in the meatball samples. 10 fish ball samples found borax in 7 samples, representing 70%, followed by 8 meatball samples, representing 75%, Borax was detected in 6 meatballs, and 75% of all pork balls in 16 samples, borax was detected in 10 samples, representing 62.50% . The results of this study are consistent with the study on the detection of borax contaminants in food by Malinee Chinnanon (2017)⁵. In an analysis of borax content in meat and meatballs sold in Trang province, it was found that the borax content in the meatball samples was in the range of 1.608-2.572

ppm, which is unsafe for consumption and in accordance with research report “A Survey of Toxic Study 60 food sample and found detected Borax 17.3-91.2% of food samples”⁶. while the study of detecting borax in Sakon Nakhon province by Amporn Srikram and et al. (2016) Detection of Insecticides Residue in Chili and Borax in Meatball Sold in Sakon Nakhon Province Inspected 48 meatballs, found no borax⁷. There maybe because of food safety in Sakon Nakhon province is rigorous that effect on entrepreneurs to paying more attention to the selection of the safety food to distribute to consumers. Food Sanitation Bangkok (2017) examined 26,601 food samples, including meat, meat products, vegetable, fruits, ready-to-eat foods, for Borax. It was reported only 0.08% of the food sample was found to contain Borax. For only meatballs, there were 5,235 samples and 2 samples detected Borax in them which was 0.04%⁶. The Office of the Health Promotion Fund (Thai Health) reports the situation of food safety for fiscal years 2010-2017. Borax was found in meat and animal products by 0.50-1.96%⁸. From the Studies have shown that borax is used in some meat products in some areas.

Conclusion

Out of 43 meatball samples, consisting of chicken, fish, meat, mixed, pork and shrimp, Borax was detected in 26 samples, representing 60.47%, the highest percentage of the first 3 samples of 10 fish ball samples, Borax was detected in 7 samples, representing 70%, followed by 75% of the 8 meatball samples, and 75% of the 6 samples found Borax. Borax was detected in meatball products sold to consumers 62.50% of total samples studied

Recommendation

Consumers should avoid the food that may contaminate Borax such as meatball, sausage especially the advertised words like “crispy” or “fluffy” to decrease the risk of borax residue.

References

- 1 Tepparat Aeuatunnataworn. Fast food consumption behaviour working people. Journal of nakornratchasima collage [Internet]. 2018 .[Accessed May 7, 2022]. ;2018;12:1. Available from : http://journal.nmc.ac.th/th/admin/Journal/2561Vol12No1_861.pdf
- 2 Suansunandha Rajabhat University. Suansunandha Rajabhat University [internet]. 2520 [Accessed May 7, 2022]. Available from : http://eresearch.library.ssu.ac.th/bitstream/123456789/366/5/4_%E0%B8%9A%E0%B8%97%E0%B8%97%E0%B8%B5%E0%B9%88202.pdf
- 3 Bangkok Business .Thailand: Bangkok Business;Eat meatballs safely, far from cancer [internet]. 2518 [Accessed May 7, 2022]. Available from : <https://www.bangkokbiznews.com/social/725937>
- 4 Bangkok Business .Thailand: Bangkok Business;Eat meatballs safely, Harm Do not put in food [internet]. 2520 [Accessed May 7, 2022]. Available from : <https://www.nationtv.tv/news/378742783>
- 5 Malini Qinnanon. Quantity analysis of Borax in Meat and Meatballs Sold in Trang province.Rajamangala Research Journal of Thep [Internet]. 2017 [Accessed May 7, 2022]. ;2017;11:1. Available from : <http://journal.rmutk.ac.th/index.php/rmutk/article/view/233/202>
- 6 Weerawat Mahantanatrakul.A survey of toxic substance (Borex) in food in songkhla.Research Report, Department of Science, PSU [Internet]. 1980 [Accessed May 7, 2022]. ;2080. Available from : <https://kb.psu.ac.th/psukb/bitstream/2553/4196/5/151184.pdf>
- 7 Srikram, A. , Wadchakarn, A.I, Thorchaiyaphum, S. and Arunchai, A.Detection of Insecticides Residue in Chili and Borax in Meatball Sold in Sakon Nakhon Province .Agricultural Sci. J [Internet]. 2016 [Accessed May 7, 2022]. ;2016;47(2) : 313-316. Available from : <http://www.crdc.kmutt.ac.th/Data%202016/CRDC10/data/313-316.pdf>

8 Office of The Health Promotion Fund.Food Safety Situation Report FY 2010 – 2017.Food Safety Information Center [internet]. 2519 [Accessed May 7, 2022]. Available from : http://foodsantation.bangkok.go.th/assets/uploads/year_report_food/document/202101219 _6803.pdf