



Survey Situation Of Coliform Contaminated In Street Foods In Bangkok, Thailand

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Abstract

Background: Yaowarat Road, often known as Chinatown, is the most well-known street food in Bangkok, Thailand. In one year, many people visit Yaowarat Road; however, we can't know roadside eateries are clean or dirty; thus, we could ensure that these meals are clean and safe; if they are not clean, they may have Coliform bacteria and consequences diarrhea, vomiting, nausea, fever.

Objective: To study prevalence of coliform contamination in street foods.

Study Methods: A cross sectional study to examine coliform bacteria in street food stalls Bangkok. A Convenience Sampling Method was used for sampling 54 food samples consisting of 6 types of foods. A Coliform test kit by the Department of Medical Sciences was used to examine coliforms in the samples.

Results: A total of 54 samples of street food were examined for coliform bacteria contamination. The results showed that 20 samples (37.04%) detected coliform, 18 samples exceeded standard (90%). Top 3 types of food that coliform bacteria exceeded level of standard were Thai Salads 8 sample (88.89%), Ready-to-Eat Rice 4 samples (44.44%), Desserts 3 samples (33.33%)

Conclusion: Type of foods that were not heated enough before served have a higher chance of being contaminated with coliform besides hygiene factors of food preparation shops.

Keywords: coliform contaminated, street foods, food safety

Introduction

Yaowarat Road, often known as Chinatown, is the heart of Thai cuisine in Bangkok. The Yaowarat region has recently garnered recognition in terms of food and The restaurant, Until is well-liked by both Thais and foreign tourists and has been dubbed the "Paradise of Street Food" by CNN. Additionally, Yaowarat Road was recognised as the ninth trendiest street in the world in a Time Out survey. The survey received over 20,000 votes, with readers asked to select their favourite streets based on gastronomy, entertainment, culture, and community. Many travellers share their culinary experiences and recommendations across various platforms, drawing even more attention to the growing street food sector. Due to the COVID-19 outbreak and travel

restrictions, worldwide tourism has suffered. However, whenever travelling resumes, it is expected that the custom of visiting Yaowarat for its street food would continue.[1] [2]

Roadside abominations Take it easy, it's just a noodle shop. Many stores only possess one bucket of water. The line is not tapped. He came over after we finished eating and dipped a bowl, chopsticks, and a spoon into the bucket. Afterwards he will put noodles around for folks to eat. Furthermore, street food contains pollution, carcinogens, germs, and parasites. In any restaurant, there is a lot of smoke. As I'm not going to eat anything, the dangers of eating unclean street food. The first thing that happens within 4

minutes is diarrhea. Later, heavy metal pollution in inadequately cleaned vegetables caused infectious gastrointestinal disorders such as food poisoning, diarrhea, and cancer. Also, heavy metal pollution in inadequately cleaned vegetables caused infectious gastrointestinal disorders such as food poisoning, diarrhea, and cancer. Formaldehyde-injected fish builds up in your body if you eat it frequently. The majority of the street cuisine at Laab Koi Isaan restaurants is stir-fried and crispy, such as fried meatballs, fried chicken, fried pig, stir-fried kale, stir-fried noodles, pad Thai, stir-fried basil, and delicious foods. Due to the use of MSG, this dish is extremely salty. Seasoning with a lot of salt. This can result in elevated blood pressure. The health risks associated with polluted street food can range widely. The following are some examples of typical types of pollution and its potential health consequences: Biological contamination is the presence of bacteria, viruses, and parasites in food as a result of incorrect handling, insufficient hygiene standards, or unclean surroundings. Only a few examples include Salmonella, E. coli, norovirus, and hepatitis A. Foodborne illnesses such as diarrhea, vomiting, nausea, fever, and, in severe cases, organ damage or dehydration can result from these types of infections. Street food contains pesticides, food additives, preservatives, and poisons produced by bacteria or fungi. Long-term exposure to these chemicals can cause cancer, organ damage, developmental abnormalities, and even reproductive problems. [3] [4]

The catastrophic diarrhea outbreak in Toril, which sickened more than 200 people and claimed six lives, was reportedly brought on by street meals in Rasay and the public market there. Eating food at the public market in Toril and the street vendors in Rasay exposed 80% of the instances of diarrhea. Foodborne pathogens, including Vibrio cholera, are to blame for the outbreak of diarrhea. There were many confirmed cases of E. coli or coliform, multiple cases of aeromonas, and cholera. According to the investigations, a contaminated handler may have contaminated food during preparation and handling. Inadequate food storage, a delay in serving, and an unclean atmosphere may have all contributed to food contamination, it was also discovered.[5]

The majority of sellers are untrained, illiterate, and have little to no care for food safety, there are

increasingly serious worries regarding the safety of street meals. These worries have been proven, since research has revealed that street meals may spread harmful bacteria that invariably cause epidemics of foodborne illnesses. Such contamination frequently results from poor decontamination and sanitation, poor cooking techniques, direct and indirect contamination of cooked foods by raw foods, direct and indirect contamination of cooked foods by surfaces polluted with other substances including human or animal faeces, and contamination of cooked or raw foods by these sources. Some of the goods served on the streets, including salads and fruits, are consumed raw and are therefore at risk of being contaminated by manure, irrigation water, or water used to rinse and sprinkle them after harvest in order to maintain their freshness. In light of the potential health dangers linked with foods sold on the street, customers are growing more cautious. Although vendor practises including inadequate temperature control, excessive storage, and the use of inappropriate forms of packaging might promote pathogen growth, preharvest contamination is unaffected by vendors' knowledge or practises of food preparation, good or bad. [6]

According to the research on Microbial levels on street foods and food preparation surfaces in Mangaung Metropolitan Municipality, South Africa found that the meat obtained in Thaba Nchu, Bloemfontein and Botshabelo showed high microbial counts and the growth of S.aureus which indicates the presence of unsanitary food handling practices of food vendors, contributing to foodborne pathogens. Moreover, the existence of pathogenic organisms such as E. coli is a cause for concern as it usually indicates faecal contamination, which could bring about further diseases from mild to severe symptoms. Accordingly, the consumption of contaminated street foods can evoke community health problems.[7]

Yaowarat Road has been a renowned source of street cuisine among worldwide tourists. There are a variety of restaurants located within buildings and along the streets. Those comprise savory food, varied desserts, as well as fresh food and culinary components. Its winding lanes fill with everything from traditional Thai-Chinese food to new fusion cuisine. Its culinary hotspot, vibrant surroundings, and fragrant aromas have drawn gourmets and tourists from all over the world. Consequently, it is such a significant place to

examine food contamination. Because it can take a vast influence on a large number of people.[8][9].

Objective

1. To study prevalence of coliform contamination in street foods.
2. To study the percentage of coliform contamination which exceeded the standard in street foods.

Study Methods

This study was to examine coliform bacteria in street food stalls in the Yaowarat area. A Convenience

Sampling Method was tested with a kit for detecting coliforms in food of the Department of Medical Sciences.[10] for the sensitivity of this assay. The minimum number of coliforms detected is 10 colonies or 10 birds in 1 gram of feed.

Sampling

The sampling of 6 types of food was Grilled Food, Dessert, Fried Food, Steamed Food, Ready-to-Eat rice, and Thai Salads, 9 samples for each type, totaling 54 samples. Details are as follows.

Table 1: Types of foods and amounts taken in the study

No.	Type of Foods	Number of Samples
1	Thai Salads	9
2	Ready-to-Eat Rice	9
3	Desserts	9
4	Fried Foods	9
5	Grilled Foods	9
6	Steamed Foods	9
Total		54

Tools and equipment

a. Equipment in the test kit

1. 30 pieces of the test paper
2. 60 sterile injection tubes
3. 30 sterile plastic bags
4. 30 bottles each of solution 1 and solution 2
5. 1 set of cotton wool and alcohol bottle
6. 1 bottle of Antiseptic
7. 1 test manual

b. Additional examination equipment

1. High solution scale
2. Scissors
3. Long-handled metal spoon
4. Lighter or alcohol lamp

Sample preparation process

The first step in sample preparation. Samples were randomly purchased on the 30th of June 2023 at 5 pm, Thai time. Samples tested on 30th of June 2023 at 7 pm, Thai time. The food was divided into 6 types of food, 6 samples per type and divided into sterile bags each per 11 gram (g). In order to do that, take the sample to detect the next coliform.

Test method

1. Use a cotton moistened with alcohol to wipe both hands, spoon, scissors and food containers in the area that will be opened.
2. Hold a scissor over a lighter or alcohol burner. Then wait for it to cool down for a moment before cutting the container.
3. Hold a lighter or alcohol burner over a spoon and let it cool down for a moment.
5. Weigh the food with the spoon from item 2 and put in a sterile plastic bag.
6. Pour 1 bottle of liquid into a plastic bag. Then shake the bag vigorously at least 25 times.
7. Use a sterile injection tube to suck 1 cc (1 ml) of water from the bag (Beware of contamination. Do not let the tip of the syringe touch with the examiner's hand or something else before using.)
8. Inject into the reagent bottle 2 completely, close the cap tightly and shake the bottle vigorously at least 25 times.
9. Use a new injection tube to suck 1 cc (1 ml) of water from the bottle in item 7.
10. Touch the tip of the injection tube with the test paper and spray the water out.
11. Gently press the air out of the test paper envelope then close the envelope completely, and keep the test paper in a dark room at room temperature for 24 hours.

Table 2. How to interpret data

Types of food	Number of Red Spots	Measurement	Number of Coliform (Per 1 gram)
1. Food according to the announcement of the Ministry of Public Health		✓	
1.1 Jam, Jelly, Sweetened Condensed	0	X	

Milk, Seasoning Sauces, Soy milk, Soybean paste 1.2 Pasteurized milk at the production site	1 or >1	✓	Number of red spots X 10
	0 - 10	X	
	>10		
2. Ready-to-eat food, carts, stalls, restaurants	0 - 4	✓	Number of red spots X 100
	5 or >5	X	

✓ pass > more than X not pass



Picture No. 1
Test result of a ready to
eat food sample

Picture No. 2
Test result of a fried
food sample

Picture No. 3
Test result of a Thai
Salad sample

Picture No. 4
Test result of a Stream
food sample

Results

Fifty four food samples were tested for the presence of Coliform bacteria. The food tested this time was divided into 6 types, 9 samples per type. 19 samples were found to be contaminated, which was 35.19% of the total. Nine Thai salads (100%) were found to be contaminated. Four ready to eat rice (44.44%), four Deserts (44.44%) were contaminated. Two samples of fried foods (22.22%), one sample of grilled foods (11.11%) and no samples of steamed foods were contaminated. (Table 3)

Table 3 : Coliform test results for each type of food samples (n=54)

		Result
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Type of Foods	Total number of samples	No. of sample with red spot	Percentage of samples with red spot
Thai Salads	9	9	100.00
Ready-to-Eat Rice	9	4	44.44
Desserts	9	4	44.44
Fried Foods	9	2	22.22
Grilled Foods	9	1	11.11
Steamed Foods	9	0	0.00
Total	54	20	37.04

In all 18 samples showed the presence of coliform bacteria in exceed of the standard. Eight of the Thai salads (88.88%). Four of the ready to eat food (44.44%). Three of the desserts (33.33%). Two of the fat fried foods (22.22%), one of the grilled foods (11.11%) and none of the steamed foods. (Table 4)

Table 4 : Number of samples and the percentage of contamination that exceeded the standard (n=54)

Type of Foods	Total number of samples	Result	
		No. of sample with excess red spot from the standard	Percentage of samples with excess red spot from the standard
Thai Salads	9	8	88.88
Ready-to-Eat Rice	9	4	44.44
Desserts	9	3	33.33
Fried Food	9	2	22.22
Grilled Food	9	1	11.11

Steamed Foods	9	0	0.00
Total	54	18	33.33

Discussion

From the detection of coliforms in all 54 samples of street food, coliforms were detected in 20 samples, representing 37.04% of the samples detected with coliforms. Coliforms exceeded the standard in 18 samples, representing 90% of the samples contaminated with coliforms. The food samples studied were divided into 6 types, 9 samples per type. Coliforms were detected in 9 samples of spicy food, representing 100% and exceeding the standards in 8 samples, representing 88.89 percent. Ready-to-eat rice food, cattle were detected. 4 Coliform samples All 4 samples exceeded the standard. Sweet food, 4 samples, 3 samples exceeded the standard, accounting for 75.00% Fried food, 2 samples exceeded the standard, 2 samples accounted for 100.00% . Grilled food, 2 samples, 1 sample exceeded the standard, accounted for 50.00% Steamed foods were none of Coliform bacteria were found.

Coliform was detected in 20 samples out of 54 samples. This may be due to the general nature of street food. Street food is sold in an open area without cover. Dust may be blown along with germs to attach to the food. Cooking equipment This is coupled with the health risks of the cooks. that may not be rigorous enough and food ingredients themselves may be contaminated When used to cook food, materials, equipment [11] thus causing contamination. [12] [13]

The result of the study found that Coliform contamination in Thai Salads, Ready-to-Eat Rice and Desserts presented a percentage of 100, 44.44 and 44.44 respectively which is the top three highest percentage types of foods. Coliform was found to be prevalent in specific types of food such as Thai Salad, Ready-to-Eat-Rice, Desserts compared to other types of foods. These samples share similar characteristics that they were pre cooked prior served to customers. Moreover, understandard of personal hygiene and sanitation of food vendors could be attributed to detection of Coliform in these types of

samples. The result of this study is in line with Wandee Bunyaratratchata et al. [14] that studies bacteria in cooked foods. The result showed that the percentage of Thai Salads samples were contaminated with coliform bacteria at 100 percent, followed by Ready-to-Eat Rice, 77.78 percent.

The results of the study showed that specified types of food such as steamed foods, grilled foods, and fried foods which are usually heated prior handed to customers were found to contain least coliform bacteria. This may be because Steamed Foods,Grilled Foods,Fried Foods is freshly prepared cuisine; and through extremely high heat, preventing pathogens from being developed. Furthermore, it could be because the store-bought Steamed Foods,Grilled Foods,Fried Foods is clean and freshly made. In addition,Most bacteria caused by foods can be avoided with proper food handling and storage. Certain conditions must be met in order for germs to proliferate in food. Even if potentially harmful bacteria are present in uncooked or raw food, they will not be able to survive, thrive, and proliferate, causing illness, if the atmosphere and conditions are controlled. [15] Coliform was not detected in steamed food samples while coliform bacteria was found in 11.11 percent of Grilled food samples and 22.22 percent of Fried food samples depending on the level of heat the foods were re-cooked prior to customers. Different types of food may need different levels of heat to kill different types of bacteria [16]. However, coliform bacteria was found in samples of steam rice chicken [12], this is due to steam rice chicken usually pre cooked for hours prior to serving to customers, if the food was not met hygiene or sanitary standard there is a high chance of coliform bacteria contamination in food.

Conclusion

A total of 54 samples of street food were examined for coliform bacteria contamination. The results showed that 20 samples (37.04%) detected coliform, 18 samples exceeded standard (90%). Top 3 types of food that coliform bacteria exceeded the level of

standard were Thai Salads 8 samples (88.89%), Ready-to-Eat Rice 4 samples (44.44%), Desserts 3 samples (33.33%).

Recommendation

1. Select freshly cooked food that passes through a hygienic process.
2. Avoid food that has undercooked ingredients. These are usually contaminated if they are not passed through enough heat level.
3. Select a clean food stall that stores food in tightly closed containers, free from flies, other insects and dust.
4. Before buying any street foods, it would be better to look at the overall food stall's hygiene, both food organization and location. These can initially indicate safety of the food.
5. Food vendors should regard hygiene as the prior criteria to others in every food process and storage. Since it has a huge impact on consumers' health.

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