

Chapter 2

Prevalence of *Bacillus cereus* in Ready-to-Eat Foods in Northern Perak, Malaysia

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ABSTRACT

Food poisoning cases in Malaysia showed an increasing trend every year where 496 episodes were reported in 2018 as compared to 401 episodes in the same week of the year 2017. Bacillus cereus is one of the foodborne pathogens related to food poisoning cases in Malaysia. The main cause for the outbreak of B. cereus is the unregulated temperature during holding time. This study was conducted to detect the presence of aerobic bacteria and B. cereus present in ready-to-eat food in Northern Perak. A total of 83 food samples were collected and analyzed for the microbial count. The result shows that aerobic bacteria and B. cereus were detected in 28% of the samples. B. cereus count in food samples tested ranged from 100 cfu/g to 42000 cfu/g, whereas the aerobic bacteria recorded a range of 500 cfu/g to 2100000 cfu/g. The highest percentage of B. cereus was found in rice-based food, followed by meat, poultry, and gravy dishes. Positive colonies of B. cereus were further tested for anti-microbial resistance profile. Most B. cereus isolates showed resistance to tetracycline and clindamycin.

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INTRODUCTION

Food poisoning is the result of eating contaminated, spoiled, or toxic food. According to the Centers for Disease Control and Prevention (CDC) Trusted Source, 1 in 6 Americans will contract some form of food poisoning every year. In Malaysia, 50.90 incidence rate per 100,000 population of food and waterborne disease involved food poisoning, followed by dysentery (0.67), typhoid and paratyphoid (0.55), hepatitis A (0.29) and cholera (0.25) (Ministry of Health Malaysia, 2020). Symptoms can differ depending on the source of the infection. The incubation time for symptoms to appear also depends on the source of the infection, but it can range from 30 minutes to 15 hours (Food & Drug Administration [FDA], 2012).

Common causes of food poisoning typically include at least three of the following symptoms: abdominal cramps, diarrhea, vomiting, loss of appetite, mild fever, weakness, nausea, headaches. *Staphylococcus aureus*, *Escherichia coli*, and *Bacillus cereus* have been identified as the most common pathogenic microorganism from food and hand swab samples (Okareh & Erhahon, 2015) and the isolates of *Bacillus cereus* has been shown to demonstrate resistance to various common antibiotics (Penido et al, 2013). In addition, a significant percentage of outbreaks of foodborne diseases are caused by foods that are poorly processed (Fang et al., 2003). The objectives of this study were to determine the prevalence of *B. cereus* in ready-to-eat (RTE) food and the antimicrobial resistance of detected colonies towards common antibiotics.

BACKGROUND

Food Poisoning Cases in Restaurants

Almost 1 in 10 people in the world fall ill every year after consuming spoiled food, causing 420,000 deaths (FDA, 2018). From 1992 to 2009, 677 restaurant outbreaks reported in England and Wales affected 11,795 people with 491 hospitalizations (Gormley et al., 2012). Department of Standard Malaysia (2020) reported that food and water-borne diseases increased by 12% in 2019 where 97% are food poisoning cases.

Food handling and preparation practices in the restaurant followed by food handlers are the most common contributing factors of food poisoning reported in restaurants in the United State from 1998 to 2013 (Angelo et al., 2017). Numerous studies on local ready-to-eat (RTE) food have linked hygiene practices to the cross-contamination from hands to food (Okareh & Erhahon, 2015 and Lee et al., 2017). Apart from cross-contamination, environmental contamination, and under-cooked dishes were identified as contributing factors of food poisoning in the restaurant

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