

Prevalence of Bacteria food poison from vegetable salads

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Citation

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Abstract

BACKGROUND: Recently, there were several cases of bacterial food poison in the student community of Ambrose Alli University, Ekpoma. However, there were no studies that isolated the common bacteria causes of food poison in this environment. The objective of this study was to isolate and characterize the common bacteria food poison in Ekpoma, Nigeria. **METHOD:** Ten prepared vegetable salad samples obtained at various sales points in Ekpoma were investigated for the isolation of Bacteria using standard cold and non-cold enrichment method. **RESULT:** The result obtained demonstrated the presence of *Staphylococcus aureus* (50%), *Bacillus* (30%), *Proteus* (20%), *Yeast* (10%). The commonly diagnosed *Listeria monocytogene* was not isolated. **CONCLUSION:** Appropriate hygienic measures for the consumption of raw food products, canned foods and vegetables should be practiced.

INTRODUCTION

Food borne diseases are multi factorial in origin. It could follow ingestion of Food containing infectious organisms or non infectious substances. Food-borne diseases (FBDs) constitute a serious public health problem worldwide.¹ There is an estimated 2million deaths in children worldwide.^{1,2}

Chemicals, heavy metals, parasites, fungi, viruses and bacteria can cause food borne illness. However, bacteria related food poisoning is the most common, but less than 20 of the many thousands of different bacteria actually are the culprits. More than 90 percent of the cases of food poisoning each year are caused by *Staphylococcus aureus*, *Salmonella*, *Clostridium perfringens*, *Campylobacter*, *Listeria monocytogenes*, *Vibrio parahaemolyticus*, *Bacillus cereus*, and Enteropathogenic *Escherichia coli*, *proteus*. *Yeast* have also been reported as contaminants from reuse of rubber bags.^{3,4} These bacteria are commonly found on raw foods like salads, eggs, beef, vegetables, cheese, ice cream, unpasteurized milk, fish, fresh fruits, canned foods, mushrooms etc.^{5,6} Incubation periods of the various organisms causing food poison differs. Normally a large number of food-poisoning bacteria must be present to cause illness.

There is neither racial, age nor sex predilection noted. However, some researchers have reported outbreaks of food poison involving specific group of bacteria in some areas. This depends on the source of food and method of food preparation which of course might be culture determined.

Outbreaks of *Staphylococcus aureus*, *Bacillus* and *proteus* food poisons after eating in a restaurant have been reported by some researchers.^{7,8,9,10} In 2001, Norinaga Miwa reported an outbreak of *staphylococcus aureus* food poison due to the consumption of eggs in boxed lunches prepared at their company cafeteria.⁷

Vijay et al reported an outbreak of *staphylococci* species which occurred in the state of Madhya Pradesh (India) after the consumption of a snack called "Bhalla" made up of potato balls fried in vegetable oil. More than 100 children and adults who ate the snack suffered from the typical symptoms and required hospitalization. Food and clinical samples were found to contain a large number of enterotoxigenic *Staphylococcus aureus*.⁸ In 2008, Lorraine et al reported 39 outbreaks of *bacillus cereus* food poison in the British Columbia, Canada, after eating various foods in the restaurants.⁹ Yong Wang et al reported an outbreak of *proteus mirabilis* food poison that occurred in august 2008 in a group of 13 persons who ate stewed pork balls in brown sauce in Beijing.¹⁰

Diagnosis of food poison depends on the pathognomonic features of the food borne illness or bacteria. A careful medical history is also as essential as the laboratory investigations of the specimens involved. The general signs and symptoms include nausea and vomiting, diarrhea (watery or bloody), severe abdominal pain and cramps, fever, meningeal signs, oliguria, myalgias, lymphadenopathy

and neurologic features. The first step in preventing food poisoning is to assume that all foods may cause food-borne illness and appropriate preventive measures should be employed before the food is ingested.

The main treatment for food poisoning is fluid replacement (rehydration) through intravenous infusion and oral intake. The use of antibiotics is restricted to some cases of serious bacteria food poison. This is because some food poison cases resolve unnoticed. Anti vomiting and anti diarrhea drugs may be tried in severe cases. Admission to the hospital depends on the severity of the illness, dehydration and response to therapy. Extremes of age, pregnancy and immunodepressed individuals should be admitted to the hospital without delay. Recently, there has been several reports of bacteria food poison cases at the student environment of Ambrose Alli University, Ekpoma. We are not aware of any study on identification of the bacteria causes of food poison in this environment. The objective of this study was to isolate and characterize the common organisms that cause food poison from vegetable salad in Ekpoma, Nigeria.

MATERIALS AND METHOD

All specimen used included: McCartney bottles, test tubes, pipette, bijoux bottles, distilled water, detergents, cotton wool, beakers, conical flasks, test tubes, forceps, inoculating loops, aluminium foil, Bunsen burner, autoclave, vegetable salads, coleslaw, liquid and solid medias. These were properly sterilized with detergents, hot air oven, Bunsen burner and autoclave.

Liquid media used in this study were enrichment broth base with selectivity for common bacteria. Solid media used were also selective for common bacteria causes of food poison. Ten different salad samples comprising of leafy vegetable salads, coleslaw, were purchased from food outlets in Ekpoma.

A total of 225ml of the selective broth base containing the enrichment for the common bacteria were dispensed into a conical flasks that has been sterilized. And 25g of the salads samples were introduced into it and homogenized, incubated at 30c for 7 days, sub-cultured into the various agar plates, blood agar plates with antibiotics (Nalidixic acid) and incubated at 37c overnight. Culture plates were examined and preliminary identification of isolates was done using their colonial morphology. Biochemical confirmatory tests like gram staining, motility at 25c, Oxidase, Indole and presence of Catalase were then performed.

RESULT

Staphylococcus aureus was found in greater number of the vegetable salads than other micro organisms as demonstrated in table 1 below. This was followed by bacillus specy, Proteus and yeast.

Figure 1

TABLE 1: The prevalence of micro organisms (bacteria) causing food poison from vegetable salad in Ekpoma, Nigeria.

Organism of samples	Frequency of isolation n = 10
Staphylococcus spp	5(50%)
Bacillus species	3(30%)
Proteus spp	2(20%)
Yeast	1(10%)

DISCUSSION

Food-borne diseases (FBD) are defined by the World Health Organization as “diseases of infectious or toxic nature caused by, or thought to be caused by the consumption of food or water”.¹¹ Symptoms vary widely, depending on the etiological agents. Diarrhoea and vomiting are the most common. Among FBDs, food-borne infections are caused by many different disease-causing pathogens that can contaminate foods. These include Staphylococcus aureus, Salmonella, Clostridium perfringens, Campylobacter, Listeria monocytogenes, Vibrio parahaemolyticus, Bacillus cereus, entero-pathogenic Escherichia coli and proteus etc.¹¹ Yeast have also been reported as contaminants from reuse of rubber bags.¹²

The report of this present study revealed that staphylococcal aureus infection was the leading cause of food poison in Ambrose Alli University and its environs. Staphylococcal food poisoning, caused by enterotoxin-producing strains of Staphylococcus aureus, is one of the most common food borne illnesses. Sudden onset of symptoms occurs 30 minutes to 8 hours after eating contaminated food. The incubation period may vary in relation to individual susceptibility, amount of toxin in the food, and amount of food ingested. The incidence of staphylococcal food poison is much higher than the figure that was reported due to the short duration of illness (1-2days) and almost always self-limited. Hence, many do not seek medical advice. However, deaths have been reported.¹³

An outbreak of staphylococcus aureus food poison was reported in the United States of America in1997 after eating

a baked ham with high salt content.¹⁴ Baked ham is often implicated for Staphylococcal food poison because the baking destroys many of the microorganisms and the high salt content inhibits the other organisms while allowing staphylococcus aureus to grow. Jones et al also reported staphylococcal food outbreak in the United State of America following the ingestion of a shredded pork barbeque and coleslaw bought from a convenience-market delicatessen.¹⁵

Other bacteria that were isolated in our study included Bacillus species(30%),Proteus species (20%) and yeast(10%). The work of Lorraine et al (2008) corresponds with our report. They identified different species of Bacillus responsible for the serious 39 outbreaks of food poison recorded in Britain, Columbia and Canada recently.⁹ They concluded that B. cereus caused 23 outbreaks, B. thuringiensis implicated in 4 cases, B. mycoides in 1 case while there were mixed strains in 11 outbreaks.⁹ Dierick et al had also reported Bacillus cereus as a well-known cause of food-borne illness that is not commonly reported because of its usually mild symptoms. However, he described a fatal family outbreak due to liver failure after the consumption of pasta salad.¹⁶ Michael et al reported scombroid fish poisoning in six people who ingested contaminated fish in a restaurant. Scombrototoxin (histamine toxicity) is released by the decomposition of the endogeneous flora attributed to Proteus morgagni.¹⁷ His report corresponded with that of Yong Wang et al who reported an outbreak of proteus mirabilis food poison that occurred in august 2008 in a group of 13 person who ate stewed pork balls in brown sauce in Beijing .¹⁰ Yeast food poison was reported among two high schools students who drank box juice containing high amount of yeast in Forest trail middle school in park forest /Chicago heights school district.¹⁸ The presence of yeast in food has earlier been ascribed to contamination of reused polyethylene bags.¹²

In conclusion, prevention is the best mode of food poison management. Appropriate hygienic measures for the consumption of raw food products, canned foods and vegetables should be practiced regularly. The government, under the ministry of health should establish a unit that will register, educate and re-educate the food vendors or proprietors of food outlets. Finally, the activities of these food handlers should be monitored regularly and appropriate disciplinary action should be emphasized and implemented.

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References

1. Miller MA, Sentz J, Rabaa MA, Mintz ED. Global epidemiology of infections due to Shigella, Salmonella serotype Typhi, and enterotoxigenic Escherichia coli. Epidemiol Infect. Apr 2008; 136 (4): 433-5.
2. Koepke R, Sobel J, Arnon SS. Global occurrence of infant botulism, 1976 - 2006. Pediatrics. Jul 2008; 122(1):73-82.
3. WHO 2004. Joint FAO/WHO workshop on Enterobacter sakazakii and other microorganisms in powdered infant formula, Geneva, Feb. 2-5. World Health Organization, Geneva, Switzerland. Meetings/dec2004/en/print.html, accessed 5/5/04.
4. Wilcke, B.W., Midura, T.F., and Arnon, S. S. 1980 . Quantitative evidence of intestinal colonization by C . botulinum in four cases of infant botulism. J. Infect. Dis.14: 419.
5. American Medical Association; American Nurses Association - American Nurses Foundation; Centers for Disease Control and Prevention; Center for Food Safety and Applied Nutrition, Food and Drug Administration; Food Safety and Inspection Service, US Department of Agriculture. Diagnosis and management of food borne illnesses: a primer for physicians and other health care professionals. MMWR Recomm Rep. Apr 16 2004; 53: 1-33.
6. Noah N. Food poisoning from raw fruit and vegetables. Introduction. Epidemiol Infect. Mar 2009;137(3): 305-6.
7. Fry AM, et al. (2005). Food borne disease. In GL Mandell et al., eds., Principles and Practice of Infectious Diseases, 6th ed., vol. 1, pp. 1286–130. Philadelphia: Elsevier Churchill Livingstone.
8. Norinaga M, Asako K, Takashi M, Masato A. An outbreak of food poisoning due to egg yolk reaction-negative Staphylococcus aureus. Intern J Food Micro 200; 64(3): 361-366.
9. Vijay N, Ranu A, Dev VK, Ajay KG, Lokendra S. Isolation and characterization of heat resistant enterotoxigenic staphylococcus aureus from a food poisoning outbreak in India subcontinent. Inter J of Food Micro 2007; 117(1): 29-35.
10. Lorraine M, Kathryn B, Daniel B, Judith L. Isaac-Renton, David CN. Identification of bacillus cereus group species associated with food poisoning outbreaks in British Columbia and Canada. Appl Environ Microbiol 2008; 74(23): 7451 -7453.
11. Yong W, Shouyin Z, Jiyun Y, Hui Z, Zhengquan Y, Yansong S, Ling Z, Yunfeng Z, Hongbin S. An outbreak of Proteus mirabilis food poisoning associated with eating stewed pork balls in brown sauce, Beijing. Food Control 2010; 21(3): 302 – 305.
12. Yves Le L, Florence B, Michel G. Staphylococcus aureus and food poison. Genet Mol Res 2003; 2 (1): 63 – 76.
13. Karen Hawthorne. Back to plastic reusable grocery bags may cause food Poison. The appetizer. A Canadian National news paper (theappetizer@ nationalpost.com). posted may 20, 2009.

13. Archer GL. Staphylococcal infections. In: Goldman L, Ausiello D, eds. Cecil Textbook of Medicine. 23rd ed. Philadelphia, Pa: Saunders Elsevier; 2007: chap 310.
14. Hocking, A. D. et al. (2003). Food borne Microorganisms of Public Health Significance. 6th ed. North Sydney. AIFST NSW Branch Food Microbiology Group .
15. Jones TF, Kellum ME, Porter SS, Bell M, Schaffner W. An outbreak of Community acquired foodborne illness due to methicillin-resistant Staphylococcus aureus. Another step in the inexorable march of MRSA. Emerg Infect Dis 2002; 8 (1): 82 – 84.
16. Dierick K, Van Coillie E, Swiecicka I, Meyfroidt G, Devlieger H, Meulemans A, Hoedemaekers G, Fourie L, Heyndrickx M, Mahillon J. Fatal Family outbreak of bacillus cereus associated food poisoning. J Clin Micro 2005; 43 (8): 4277- 4279.
17. Michael GH. Something fishy : six patients with an unusual cause of food poison. Emerg Med 2003; 15(3): 293 – 295.
18. Marler C . Juice that sickened students drank had more yeast than normal. Food Poison Journal. [http://www. foodpoisonjournal. com/admin/trackback/133629](http://www.foodpoisonjournal.com/admin/trackback/133629).

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