Detection of Campylobacter jejuni in raw meat

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ABSTRACT

Background & Objectives: Campylobacter jejuni is a Gram negative, microaerophilic, non-spore-forming and a small curved bacillus which is able to cause foodborne infection in human. In this study the occurrence of C. jejuni in poultry and beef meat was investigated.

Materials & Methods: Forty raw meat samples including 22 poultry samples and 18 beef samples were investigated for the presence of C. jejuni. To isolate the bacterium, the samples were initially enriched in Preston Broth medium and subsequently transferred to Campylobacter selective Agar containing defibrinated sheep blood and antibiotics. The biochemical tests were used for identification of isolated bacteria at species level.

Results: Three poultry samples were positive for C. jejuni.

Conclusion: Alimentary tract of chickens contain high numbers of C. jejuni therefore, this bacterium can be easily found in their feces. It is recommended to use chlorinated water in birds’ feed and to perform slaughtering, skinning and evisceration under aseptic conditions to prevent campylobacteriosis in human from poultry meat. None of the beef samples yielded any Campylobacter, this may be due to limited number of samples of beef meat analyzed in this study.

Keywords: Campylobacter jejuni, foodborne infection, raw meats.

INTRODUCTION

Campylobacter jejuni is a curved, S-shaped, or spiral Gram negative bacillus which is highly motile with corkscrew like motion. It grows under microaerophilic conditions and its optimum growth temperature is around 42°C. C. jejuni is a foodborne zoonotic pathogen and has been recognized as an important cause of colitis in developed countries. The main reservoir of this bacterium is the alimentary tract of different animals, mainly chickens and turkeys. Consumption of undercooked beef and poultry and raw milk are the main vehicles of this bacterium from animals to humans. Two to five days after ingestion of contaminated food, gastrointestinal symptoms including abdominal cramps, fever and diarrhea will appear. In this foodborne disease, vomiting is not usually present and diarrhea may eventually become bloody diarrhea or dysentery (1-3). The objective of this paper was to detect C. jejuni in raw meats.

MATERIALS AND METHODS

In this study 40 raw meat samples including 22 from poultry and 18 from bovine source, were investigated for the presence of Campylobacter jejuni. These samples were collected randomly from butcheries and poultry shops in Tehran. At the beginning, 10 g of each sample was added to 90 ml of Preston Broth containing defibrinated sheep blood and antibiotics. For this purpose, 10 ml defibrinated sheep blood plus 2 ml antibiotic solution (vancomycin, polymixin, trimethoprim) were added to 200 ml Preston Broth. After that, the Preston Broth was placed in a jar containing Anaerocult C and was incubated at 37°C for 4 to 6 hrs and then at 41.5°C for 44 to 48 hrs. Then the Preston Broth was surface plated on Campylobacter Agar containing defibrinated sheep blood and antibiotics as mentioned before. The inoculated plates were incubated at 41.5°C for 5 days in a jar containing Anaerocult C and a piece of moist cotton to save the
environmental humidity. When suspected colonies were detected, confirming tests including Gram stain, growth at 25°C, oxidase and catalase tests, sensitivity to nalidixic acid and cephalothin and hippurate hydrolysis were performed (4, 5).

RESULTS

Among 40 raw meat samples or out of 22 poultry samples, 3 chicken meats were contaminated with \textit{C. jejuni}. Therefore, 7.5% of all raw meat samples and 13.6% of raw poultry contained \textit{C. jejuni}. The results of confirming tests on suspected colonies were as follows: we observed curved Gram negative bacilli, unable to grow at 25°C under microaerophilic conditions, oxidase and catalase positive, sensitive to nalidixic acid, resistant to cephalothin and able to hydrolyze sodium hippurate. These results completely match with \textit{Campylobacter jejuni} biochemical characteristics.

DISCUSSION

\textit{Campylobacter jejuni} has been identified as one of the main causes of food poisoning. In this study 3 raw poultry meat and samples, contained colonies with the exact biochemical characteristics of \textit{C. jejuni}. This means that 13.6% of the poultry samples were contaminated with this bacterium. Therefore, consumption of undercooked chicken meats may cause food poisoning and complete cooking of poultry is critical to prevent this infection.

The most common species of \textit{Campylobacter} in animals and foods are \textit{Campylobacter jejuni}, \textit{C. coli}, \textit{C. lari} and \textit{C. upsaliensis}. Among these, \textit{C. jejuni} is most commonly involved in human gastroenteritis. The results of many biochemical tests are similar among these species. \textit{C. upsaliensis} can be easily distinguished from others due to its sensitivity to cephalothin. Hippurate hydrolysis is the only biochemical test which can differentiate between \textit{C. jejuni} and other \textit{Campylobacter} species (2-5).

Campylobacteriosis is one of the most common foodborne infections in the U.S. and it has been estimated that annually 1% of the U.S. population can be infected by this disease (1). The results of different studies all over the world indicate the presence of this bacterium in meats especially chicken meats. Alimentary tract of wild and domesticated birds and mammals, mainly chicken and turkey contain high numbers of \textit{C. jejuni} (6, 7).

To prevent campylobacteriosis, it is recommended to use chlorinated water in birds’ feed and to perform slaughtering, skinning and evisceration under aseptic conditions. Before the consumption of foods, the temperature in the center of chicken breasts and chicken thighs must reach at least 77°C and 82°C respectively. Ingestion of raw milk and unchlorinated water should also be avoided (3, 6 and 7).

REFERENCES