Bacteriological study of raw meat of Calabar Abattoir with public health and veterinary importance

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ABSTRACT

Ten samples of fresh meat were randomly collected from Anantigha and Ikot Eneobong abattoirs in Calabar. Samples were collected and subjected to microbial analysis using standard microbiological techniques. The results showed that the bacteria population in meat from Anantigha abattoir was significantly (p< 0.05) higher than the microbial population in Ikot-eneobong abattoir, the counts from Anantigha abattoir ranged from 1.14x10^3 to 2.62x10^3 cfu/g and 1.08x10^3 to 2.06x10^3 cfu/g, on Nutrient and MacConkey agar respectively, while counts made from Ikot-eneobong abattoir ranged from 1.40x10^3 to 2.31x10^3 cfu/g and 1.05x10^3 to 1.83x10^3 cfu/g on Nutrient and MacConkey agar respectively. Bacteria isolated from both abattoirs were Klebsiella pneumoniae, Enterobacter spp, Citrobacter freundii, Pseudomonas aeruginosa, Escherichia coli, Salmonella spp, Serratia marcescens, Pseudomonas spp and Proteus vulgaris. Statistical analysis of the mean bacterial load showed no significant difference (p>0.05) between the two abattoirs. The presence of pathogenic bacteria in meat should receive particular attention, because their presence indicates public health hazard and give warning signal for the possible occurrence of food borne intoxication.

Key words: Raw Meat, Bacteriological, Abattoir, Public health

INTRODUCTION

Bacteriology of raw meat is an aspect of the sub-discipline Food Microbiology in the field of Microbiology. It is concerned with the study of bacteria that grow on or are transmitted by meat [1]. Raw meat generally refers to any type of uncooked muscle tissue of an animal used for food. In the meat production industry, the term “meat” refers specifically to mammalian flesh, while the word “poultry” and “seafood” are used to differentiate between the tissue of birds and aquatic creatures [2].

Most food-related illnesses have historically been attributed to one of five major groups of pathogenic bacteria. These five groups are Salmonella, Shigella, Clostridium botulinum, Clostridium perfringens, Bacillus cereus, and Staphylococcus aureus. These have been joined by the emerging pathogens such as Yersinia enterocolitica, Escherichia coli, Listeria monocytogenes, and Campylobacter jejuni. Modern food microbiology views raw meat as habitats where different organisms compete for survival. The fact that there are 250 genera of bacteria and that only 25 of these are found in raw meat suggests that raw meat provide unique ecological niche. Raw meat is an ideal medium for bacteria growth, this is because of its high moisture contents, it is rich in protein, has fermentable...
carbohydrate, favourable pH and other growth factors [3]. Spoilage of meat occurs if the meat is untreated in a matter of hours or days and this result in the meat becoming unappetizing, poisonous or infectious. Spoilage is caused by the practically unavoidable infection and subsequent decomposition of meat by bacteria which are borne by the animal itself, by the people handling the meat, by their implements and the environment in which the animals are kept. Meat can be kept edible for a much longer time though not indefinitely if proper hygiene is observed during production, processing, and if appropriate food safety, food preservation and food storage procedures are applied [4]. Slaughter house (abattoir) inspection of live animals (ante-mortem) and the carcass (post-mortem) plays a key role in the surveillance network for animal diseases and ensures the safety, suitability of meat and by product for their intended uses. Control or reduction of biological hazards of animal and public health importance by ante and post-mortem meat inspection is a responsibility of the veterinary services [5]. Bacterial genera that commonly infect meat while it is being processed, cut, packaged, transported, sold and handled include: *Salmonella spp*, *Shigella spp*, *E.coli*, *Bacillus proteus*, *Staphylococcus epidermidis*, *Staphylococcus aureus*, *Clostridium perfringens*, *Bacillus cereus* and *Faecal Streptococci*. These organisms spoiling meat may infect the animal either while it is alive “endogenous disease” or may contaminate the meat after its slaughter “exogenous disease” [4]. It is on this basis that survey such as this is necessary and essential to give useful information about the bacterial load in most raw meat of Calabar abattoir.

**MATERIALS AND METHODS**

**Study site and sample collection**

This study was carried out in Calabar, Cross River State. Cross River State is a coastal state in South-South region of Nigeria. It shares boundaries with Benue State to the North, Enugu and Abia State to the West, to the East by Cameroun and to the South by Akwa-Ibom and the Atlantic Ocean. Calabar is located approximately between longitude 80 19'E and 80 21'E and latitude 40 55'N and 40 58'N. Ten samples from different portions of fresh meat were collected from the two major abattoir in Calabar. Anantigha abattoir and Ikot Eneobong abattoir. The samples were collected at random using hand gloves into a flask wrapped with aluminum foil and labeled; the flask was sealed and taken immediately to the laboratory in less than two hours. All samples were stored at 4°C upon arrival to the laboratory and processed the same day.

**Microbiological Evaluation**

10 grams of each fresh meat sample was weighed using a weighing balance and placed into a sterile blender, 90ml of distilled water was also added and the mixture homogenized to obtain a thoroughly blended meat. The homogenized meat was aseptically transferred into a sterile beaker. 1ml of the homogenized meat was aseptically transferred using a sterile 1ml sterile pipette into a test tube containing 9ml sterile distilled water and tenfold serial dilutions was carried out.

All media used were prepared according to the manufacturer’s instruction. After preparation it was sterilized by autoclaving at 121°C for 15 minutes after which it was allowed to cool and 15mls aliquots was poured on sterile petri dishes.

**RESULTS AND DISCUSSION**

The result shows that they were significant difference (P> 0.05) in the microbial counts obtained from Anantigha and Ikot-Eneobong market. This means that the counts from the two abattoirs were the same. The result from the different meat part used in the study shows significant difference (P<0.05) in the microbial counts, with the intestine having highest counts followed by kidney, liver, meat lap and backbone. The isolation of the microbial counts using MacConkey agar shows significant difference (p< 0.05) in the microbial population obtained from the Anantigha and Ikot-eneobong abattoir, however, Anantigha abattoir had more counts than Ikot-eneobong abattoir. Significant difference (p<0.05) were also observed among the samples with the intestine having more microbial population than kidney, liver, meat lap and backbone.
Fresh meat for human consumption may legally contain up to 50 million bacteria/g. The number of bacteria in a given sample may vary by several orders of magnitude. Therefore when samples of these food stuffs are assayed for...
bacteria count several dilutions are carried out in order to achieve the desired range of colonies per plate (30-300). Fresh meat samples from both locations (Anantigha and Ikot Eneobong abattoir) yield marked growth of bacteria. This is an indication of recontamination in food handling and hygiene techniques [6]. A total of forty (40) isolate comprising of eight different genera of gram negative bacteria were isolated in this study with an average incidence rate of 100% in each abattoir. This showed that both abattoirs contributed equally to the microbial diversity reported in this study. The bacteria isolates were identified as *K. pneumoniae*, *Enterobacter spp*, *C. Freundii*, *P. aeruginosa*, *E. coli*, *Salmonella spp*, *S. marcescens*, *Pseudomonas spp* and *Proteus vulgaris* by comparing their morphological and biochemical characteristics with standard reference organisms [7, 8].

Microorganism isolated from fresh meat samples in this study have been earlier found in foods, environment and other places and their pattern is similar to previous reports by [6]. The presence of these organisms in fresh meats depicts a deplorable state of poor hygienic and sanitary practices employed in the slaughtering, processing and packaging of fresh meats. Faecal coliforms as *Escherichia coli* are generally considered as indisputable indicator of faecal contamination from warm blooded animals.

The presence of *E.coil* (10.0%) and *Enterobacter spp* (12.5%) in this fresh meat samples is an indication of faecal contamination of the meats. This might be due to possible unhygienic handling of the meats during slaughtering and processing or due to possible contamination from the skin, mouth or nose of the handlers which might be introduced directly into the meat [9]. The isolation of *Enterobacter spp*, may be as a result of poor environmental conditions due to dust and contamination of the water used during slaughtering [10]. *Salmonella spp* (10.0%) another organism found in the meats is also a pathogenic organism of public health significance and concerns [11]. *E. coli* is a normal flora of the human and animal intestine and has been identified as a leading cause of food borne illness all over the world [12]. *E. coli* O157:H7 strain was not detected in any of the fresh meat samples examined. However, diarrhea caused by enterotoxigenic *E. coli* (ETEC) is highly prevalent in young children in developing countries as well as travelers [2]. Fresh meats sold to the public in open abattoirs are grossly contaminated with coliform bacteria as well as other bacterial forms. The findings of this study revealed that fresh meat sold at Anantigha and Ikot Eneobong abattoir in Calabar are contaminated with pathogenic gram negative bacteria. The possible sources of these contaminants are due to the unhygienic manner of handling meat in the abattoirs. This implies that these meats are viable source of various diseases. Some of these diseases could spread and acquire epidemic status which poses serious health hazards. Irrespective of the presence of these gram negative bacteria in fresh meat analyzed, it is believed that cooking processes and hygiene could greatly reduce the microbial load to harmless level [13].

**REFERENCES**


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