

Microbiological Examination of Meat-pie sold in Owerri Municipal

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ABSTRACT

Background: Microbial pollution of baked foods like meat-pie sold by street hawkers has become a world health challenge. Pastries foods sold in Nigeria cities are consumed by huge sector of people both the old and young.

Method: This present study was carried out to monitor the microbiological quality of street foods like meat-pie sold in Owerri municipal area of Imo state. These were analyzed by standard procedures to ascertain the colony forming units/ gram of meat-pie samples. The aerobic colony counts samples were categorize as sufficient, capable and insufficient collection according to public health laboratory services, UK guidelines for total coliform counts, because guideline were used.

Result: All the plates studied indicated the evidence of coliform. The outcome of the study prove that the meat-pie samples studied in Owerri municipal were heavily polluted with microbes, proving the non-enforcement of inspection and inadequate of maintenance of standard contact to hygienic aspect of meat-pie.

Conclusion: It is insinuated that proper ethics of hygienic and sanitary conditions has to be maintained both personally and institutionally from preparation to cleaning, is required in street food centers to avoid any food born hygienic outbreak in future.

KEYWORD: meat-pie, coliform, microbiological, municipal and Owerri.

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INTRODUCTION

Background of Study

Micro-organisms (viruses, archaeobacteria, eubacteria, fungi, algae and protozoa) are ubiquitous. They are found on the air, on land and also in water bodies. The implication of this is that, they can be encounter in food. Food is necessary to be alive. Nevertheless, human beings devour undesirable chemical and biological agents and toxins that cause food borne illness. Food-borne diseases are abnormal condition of the body cause by ingestion of bacteria, toxins and cells produced by microorganisms currently in food (Fapohunda *et al*, 2014). Food-borne illnesses destroy essential economic and quality of life phrase on society by means of acute morbidity and chronic sequelae (Duff *et al*, 2003). Food-borne diseases enclose a broad spectrum of poor health and an increase in public health challenges

globally. Already prepared (AP) foods can be explained as food that was conveying for instant devouring at the point of sale. It might be raw or cooked, hot or chilled and can be devouring with no/less heat treatment (Tsang, 2002).

WHO, (2002) reported that food borne diseases of microbial origin are of a great significance to health challenges associated with street- foods as well as fast food centers and this is an outcome of the traditional procedures that are used in preparation, unsuitable temperatures and poor personal hygiene of food handlers which are certainly the route of contamination of street-hawked food. Street foods are “already prepared” foods and beverages prepared and sold by merchants in the street and other similar public places (FAO, 2007).

Meat pies are already prepared foods or fast foods. The preparation and sale of street foods is an age old activity. It

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is almost universal in developing countries, and in the industrial world. This activity has reached new dimensions as result of rapid urbanization. It plays a significant role in the feeding of urban population with cheap accessible and nutritious foods. Street foods are served quickly, tasty and also available at reasonable rates (food edible without washing, cooking or addition preparation by the food establishment) (Muinde and Kurria, 2005). It allures all age groups, particularly the younger generations. Safety measures and healthy life of street foods rely upon the effect of chemicals, physical and microbial factors.

From the health opinion, the microbiological standard of foods is important. Street foods displayed on open yards can easily be contaminated by dusts, exhaust smoke, insects, and hands of intending buyers and stagnate waters which encourages microbial increase.

The aim of the present study was to ascertain the microbiological standard analysis of meat pies sold by street merchants in Owerri municipality.

METHODOLOGY/ MATERIALS

Materials

Meat pie samples, distilled water, laboratory mortar and pestle, measuring cylinder, test tubes, test tube racks, weighing balance, conical flask, pipettes, Bunsen burner, autoclave, cotton wool, foil, hot air oven, incubator, petri dishes, refrigerator, wire loop, masking tape, slide, cover slip, Durham tubes, alcohol, lugol's iodine, crystal violet, safranin, kovac's reagent, oil immersion, 3% hydrogen peroxide, methyl red, bijou bottles, Nutrient agar, MacConkey agar, microscope and beakers.

Sample

Quantities of 10 samples of meat pie (ready to eat food) which are sold were acquired from food hawkers randomly from five different sites in owerri municipal namely: Douglas (Eke-onunwa market), Wetheral (Road side hawkers), World Bank (World Bank market), Ikenegbu (Road side hawkers) and Orji (Nkwoorji market). In process of collecting the samples, the serving practices of hawkers were considered, such as usage of apron, hair cover, controlling of money and serving practice with gloves. The samples were enclosed aseptically in a sterile foil and convey instantly to the laboratory for analysis, cool at 47°C before pouring into the petri-dishes.

Table 1. Frequency of occurrence of bacteria from the meat-pie samples Mean viable sand coliform count of meat-pie form each location:

Location	Mean viable count (cfu/g)	Mean coliform count (cfu/g)
Douglas (Ekeonunwa market)	4.5×10^5	3.4×10^5
Ikenegbu (roadside hawkers)	3.25×10^5	3.0×10^5
Orji (Nkwoorji market)	3.7×10^5	3.2×10^5
Wetheral (Roadside hawkers)	3.6×10^5	3.3×10^5
World bank (world bank market)	3.7×10^5	3.15×10^5

Sample Analysis

10g of each sample was weighed into a clean laboratory mortar. Each sample was grinded with the support of a clean pestle in the mortar. Thereafter, the samples were diluted with 90ml of sterile distilled water in a sterile conical flask and heterogeneous completely to give a homogenous suspension. Sequential dilutions of samples were then prepared in a sterile test tubes. Sterile petri-dishes were labelled with the name and source of the meat-pie sample. 1ml each of the fourth and fifth dilution was introduced inside the petri-dishes using a pipette, for Nutrient agar and MacConkey agar. About 20mls of the Nutrient agar and MacConkey agar were discharged over the sample inoculant in their specific plates. The Nutrient agar plates were incubated at 37°C for 24 hours for aerobic colony counts and the agar was used as an enrichment medium for the growth of the coliform bacteria and incubated at 37°C for 48 hours for total coliform counts while MacConkey agar as a selective media (Anie *etal* 2019).

Preparation of Agars and Overnight Broth

A 2.8% w/v freshly prepared nutrient agar sterilized at 121°C and 100 kPa for 15 minutes was poured respectively into three sterile bottles under aseptic condition and the bottles were slantly placed on a wooden rack to solidify

Representative of the various colonial morphological forms on each of the media were selected and purified by streaking on their respective media. Uncontaminated cultures of the isolates were transferred into agar incline in bijou bottles and stored at refrigeration temperature. These were used as stock cultures for identification of the tests organisms (S.E Okafo *etal.*, 2019)

Identification of isolates

Microorganism were identified using standard biochemical and microbiological procedures according to (Anie *etal.*, 2017; Enwa *etal* 2016).

RESULTS

The total viable count and coliform counts per gram of food sample from various locations analysed for microbiological quality are as shown in Table 1 below:

From the Table I, it was observed that meat-pie sold at Douglas has the highest viable bacteria count of 4.5×10^5 cfu/g; followed by Orji and World Bank with 3.7×10^5 cfu/g respectively while Wetheral has 3.5×10^5 cfu/g and Ikenegbu has 3.25×10^5 cfu/g.

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The percentage occurrence of meat-pie sample collection from various locations showing that the bacteria percentage in meat-pie from Douglas (23%) followed by Wethral,

World Bank and Orji that are (20%), then Ikenegbu that is the least occurrence (18%). (Table 2)

Table 2. Percentage occurrence of different sources

Location	No. of Isolates	% occurrence
Douglas	158	23%
World bank	137	20%
Ikenegbu	25	18%
Orji	138	20%
Wethral	136	20%
Total	694	101%

DISCUSSION

It had been ascertain with facts that cooking does not always destroy bacteria spore or even bacteria themselves particularly in rolled and stuffed joints, poultry meat, large meat-pies and sausages (Tambekaret al 2008). This has been observed in this research owing to the frequency microbial (bacteriological count) observed in the samples of meat-pie examined. According to Tambekaret al (2008) meat extracts serves as a viable media for bacteria growth and proliferation. The entire samples from the studied area displayed the activity of coliform on them. The results show high rate of less concern in the process of preparation and or storage of the products, leading to poor hygienic conditions this was also noticed during collection of samples, the handling of meat-pie with bare-hands without clean gloves, less use of aprons, absence of hair covering and controlling of money during serving/selling can also assist to poor hygienic conditions. Also, there is heavy vehicular traffic on the road and refuse dumps presence along the roadsides might increase the air-borne debris which ultimately cause rise to contamination. The respect to Falola et al (2011) which testified to this that meat-pie have inclination to spoil quickly; this is due to its fillings which are compose of meat and vegetables which enables the invention of microorganisms in the product. The increment of the coliform times resolute to the facts that rise in microbial load; (especially pathogenic organisms) contribute to increase in the number of coliform. The coliform present immediately after production is an indication of activity of faecal contamination that is derived from the water used for the preparation of the samples, human contamination by handlers. The presence of these microorganisms can be describe by the result that human beings, that is the processors or vendors, harbour these organisms on/in their bodies in various parts(Nester et al 2007) which might be transfer into the fresh flour/water during handling, processing or vending. The environment play major role in contamination of the meat-pie samples in connection with water, specifically during washing of the fruits. According to Eleanor (2007) had earlier reported that the great significance associated with baked food products are mostly caused by *Samonella typhirium* and *Staphylococcus aureus*.

As recently reported by Annonymous (2011) on gastrointestinal infections arising involves the consumption of contaminated foods. Therefore support the view that an urgent requirement is needed to implement food safety guidelines to guarantee the safety and standard of meat-pie. Above all, the results yielded from this research proved that the entire meat-pie samples studied are contaminated. This may be associated to non-enforcement of inspection act and lack of upholding of standard hygiene routine in relation to meat-pie, thereby suggesting possible risk of infection involved in such food when consumed. Nevertheless, the principle for food hawkers are not easily reached at the moment, there is a need to work with these principles to provide a good healthy and standard of food. The government should have a better surveillance on the activities of sliced produce street hawkers in order to minimize the danger of disease outbreak in connection with consumption of contaminated food produce.

CONCLUSION

The result from the samples analysed unveiled that the long exposure of the meat-pie sample at the point of sale in connection to the environment can led to rise in microbial count. Meat-pie is best eaten without delay after production; in a way to prevent rapid proliferation of bacteria. The results proved to the facts; the longer the meat-pie stay on the shelf, the higher microbial load and the more hazardous/dangerous it is for human consumption. This can be in-line to non-enforcement of inspection act and lack of upholding of standard hygiene routine in relation to meat-pie, thereby suggesting possible risk of infection involved in such food when consumed. Though there is no guideline for street food hawkers practiced and applied by standard organization of Nigeria, nevertheless a need to work with such guidelines to prove a good and standard of food is needed.

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