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THE MICROBIAL STATUS OF COMMERCIAL 'SUYA' MEAT PRODUCTS IN EKPOMA, EDO, NIGERIA

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ABSTRACT

This study assessed the microbial status of commercial suya products in Ekpoma, Edo, Nigeria. A total of 40 suya samples were collected from 20 randomly selected Suya spots; two samples from each spot respectively. The standard method of isolating micro-organisms was adopted. The total viable count obtained ranged from 1.0 x 10^3-4.8 x 10^3. The organisms identified included 6 bacteria, two moulds, and two yeasts. Judging by the results therefore, it is obvious that commercial "Suya" products sold in Ekpoma are potentially contaminated, and calls for concerted efforts on the part of relevant authorities to check the trend, since it is a public health challenge.

Keywords: Suya meat, bacteria, fungi, sensitivity and antibiotics

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INTRODUCTION

Generally, meat is excellent in supplying high quality protein, vitamins and mineral salts (Kramiliah *et al., 1973*). Similarly, it has been reported as ideal for the growth of a wide range of spoilage bacteria (May *et al., 2003*), accounting to a great extent why it is perishable. In the world today, traditionally processed meat products are consumed in different countries, amongst which is the meat delicacy called 'Suya' (Vilar *et. al*., 2000). "Suya" is a traditional meat product gotten from boneless meat hung on stick and spiced with peanut cake, salt, vegetable oil and other flavours followed by roasting around a glowing charcoal fire (Alonge and Hiko, 1981). It has become very popular as a street delicacy in several countries, particularly those in West Africa (Inyang et al., 2005).

The high ultimate pH of meat generally makes it very susceptible to microbial growth even under the best handling or manufacturing conditions and practice (Hedrick *et al., 1994*). Sequel to these developments, some researchers elsewhere had noticed sporadic cases of gastroenteritis and symptoms of infection after consumption of "Suya" which indicated that the product indeed constitute a food safety risk (Odusole *et al., 2003*; Inyang *et al., 2005*).

Literature has it that microbial organisms isolated from "Suya" are of public health significance, as study conducted on "Suya" (dried smoked meat) sold in Ado and Akure, South West Nigeria revealed bacteria, molds, yeast and fungi (Egbebi and Seidu, 2011).

Osho (2004) also evaluated the bacteria contamination of "Suya" processed in Abeokuta, South western Nigeria and found up to 10^3 cfu/g entero-bacteriaceae in 40% of the 622 samples collected; more than 10^4 cfu / g aerobic mesophiles including *Staphylococcus aureus* in all collected samples. Inyang et al. (2005) also evaluated the bacterial quality of *Suya* sold in Markurdi, Northern Nigeria and concluded that feacal coliforms were the main bacterial contaminants although they occurred within acceptable limit.

Meanwhile Edema et al., (2008), who evaluated the microbial hazards associated with, processing of suya meat, reported that processing water, meat processing slabs, utensils, spices and raw meat revealed contamination with potential pathogens such as *Bacillus cereus*, *Staphylococcus aureus*, Salmonellae species and aflatoxigenic molds with aerobic mesophilic counts in the order of 10^5 cfu with the highest value (7.17) observed in the packaging material and the lowest value (1.47) observed in the processing water.

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It is imperative to note that the tremendous growth in the production and consumption of "Suya" in the South-South zone of Nigeria has made it a great concern to study and to know its microbial quality. This study therefore examines the microbial status of "Suya" sold in Ekpoma, Edo State, Nigeria.

MATERIALS AND METHODS

Study area: The study was carried out in Ekpoma, located in Esan West Local Government of Edo State, Nigeria, with longitude 6.13^0E and latitude 6.73^0N having a population of about 61,8700 people (Population of cities, 2007).

Sampling and Sample collection: A total of 40 samples were collected from 20 randomly selected Suya spots; two samples each at different occasions respectively. The suya samples were wrapped in sterile wrapping papers and re-enforced by aluminum foil to avoid further contamination en route to the laboratory for microbial examination.

Microbiological analysis: Pieces of suya from each sample were removed and mashed in a sterile laboratory type mortar and pestle into a paste. Twenty percent of the stock solution was prepared by weighing 20g into 100ml of sterile buffered saline, properly shaken and sieved before a twofold dilution was performed. Serial dilution was carried out from the stock solution to obtain 1:10 dilution from 6 test tubes, given a dilution of 10^{-1}, 10^{-2}, 10^{-3}, $10^{-4,}$ 10^{-5} and 10^{-6} respectively. Pour plate was conducted by obtaining 0.5ml of an aliquot from each of the test tubes and pouring into sterile petri-dishes. It was allowed to settle and 15ml of liquid nutrient agar, cooled at 45^0C was poured and incubated at 37^0C for 24hrs (Nester *et al.*, 1998). The plate viable counts were conducted as described by Barrow et al. (1991).

Samples from stock solution were inoculated asceptically with a wire loop on the prepared MacConkey agar, Nutrient agar, Mannitol salt agar, Muller Hinton agar plates and saboured dextrose agar and incubated at 37^0C between 18hrs and 24hrs as described by Cheesbrough (2000). The plates were read for growth of organisms and identification of isolates was also done using their colonial morphologies. Gram-staining, motility test and biochemical test techniques were conducted for clear identification as described by Cheesbrough, (2000), Ballowes et al, (1991) and Barron et al, (1994) while fungi identification was carried out as described by Ochei and Kolhatkar (2000).

RESULTS

For bacteria species, *Staphylococcus* had the highest proportion of 21 (33%), followed by E. coli (19; 30%), Klebsiella species (15; 23%), Enterobacter species (6; 9%), Bacillus species (2; 3%) and the least paracoccus species (1; 2%) (*See* Table 1).

For fungi species, Aspergillus had the highest proportion of 30 (57%) followed by Candida species 9 (17%), mucor 8 (15%) and the least penicillum species 6 (11%) (*See* Table 2).

Overall, the total bacteria organisms isolated were 64, while fungi organisms was 52, given a total of 117 microorganisms isolated from the 40 suya samples collected.

Table 1. The frequency and the incidence of the bacterial organisms isolated in the suya samples

Bacteria isolates	Frequency	Percentage
Staphylococcus species	21	33
Escherichia coli	19	30
Kliebsella species	15	23
Enterobacter species	6	9
Bacillus species	2	3
Paracoccus species	1	2

Table 2. Fungal organisms isolated in the suya samples

Fungi isolates	Frequency	Percentage
Aspergillus species	30	57
Candida species	9	17
Mucor	8	15
Pennicillum species	6	11

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DISCUSSION

The observed viable microbial count in "Suya" samples analysed, were in line with reports by Osho, (2004), Inyang, (2005), and Egbebi and Seidu, (2011), that "Suya processed in Abeokuta (South Western Nigeria), Markurdi (Northern Nigeria), and Ado and Akure (South West Nigeria) respectively, have microbial contaminations.

Similarly, our findings are in line with the reports by Edema et al., (2008) and Ologhobo et al. (2010) on the microbial hazards of poorly processed "Suya", as Uzeh et al. (2006) had earlier opined that the incidence of bacteria in "Suya" products in Nigeria, is of public health concern. This is attributable to the relative lack of personal hygiene amongst the sellers of Suya, since humans are the largest source of food contaminants (Marriot, 1985). Although the viable microbial count recorded in this study was relatively low, it remains however, a cause for concern, considering the established limits in the Public Health Laboratory Service guidelines for bacteriological quality of ready-to-eat food samples at the point of sale (PHLS, 2000).

On the other hand, the incidence of *Staphylococcus* spp observed in this study agrees with the report by Gilbert and Harison, (2001), since it is commonly found on hands, skin and clothing. In fact, most of those involved in the processing and sale of Suya, are usually illiterates without formal training in food preparation, which is necessary in the hygienic handling of foods) (FAO, 1999).

Furthermore, our result agrees with the findings by Shamsuddeen and Ameh, (2008) who reported a high incidence of coagulase positive Staphylococci and E.coli in Kilishi (a type of Suya product) from Kano metropolis. Recall that E. *coli* and *Klebsiella* spp were isolated from all the Suya samples examined and the presence of *Bacillus* spp in some rendered the samples unsatisfactory according PHLS (2000). Specifically, the Health Laboratory Service Guidelines (HLSG) for bacteriological quality of ready-to-eat foods at the point of sales stipulates that a food product is unacceptable if the level of *S. aureus* is about 103 CFU/g (PHLS, 2003). Also, the level of these organisms in food has been described as an index of food hygiene (Adesokan *et al*., 2008 and Jay, 1978).

Concerning the isolation of three species of molds compared to one *Candida* spp as the only yeast isolated, it is imperative to emphasize that some species of *Asperigillus* have been known to produce powerful mycotoxins which are harmful to man, and as such, their incidence in "Suya" is undesirable.

Generally, these contaminating organisms might have originated from the handler's hands (Bukar et al., 2009), the utensils, air, and even from the ingredients like the spices, because according to Frazier and Westhoff (2006), spices may even serve as a source for the contamination of processed food products.

Judging by the results therefore, it is obvious that commercial "Suya" products sold in Ekpoma are potentially contaminated, and calls for concerted efforts on the part of relevant authorities to check the trend, since it is a public health challenge.

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AUTHOR'S CONTRIBUTION

All authors (Eke SO, Irabor JI, Okoye M, Aitufe OF, Ekoh SN) were involved in the research work and presentation of this article.