Isolation of Pathogenic Organisms from Suya Meat Obtained from Selected Local Governments in Ogun East Senatorial District of Ogun State, Nigeria

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ABSTRACT

This study was carried out to isolate salmonella typhi from suya meat sold within Ijebu-Ode and Ijebu North East Local Government Areas of Ogun State. Twenty skewers of suya meat were obtained randomly from suya vendor at popular suya spots (10 spots) in Ijebu-Ode and Ijebu North East Local Government areas. The samples were immediately wrapped in sterile aluminum foil to prevent contamination and then transported to the laboratory for microbial analysis without delay. The samples were cultured on MacConkey and SSA as well as peptone water. The result was analysed using Spss 20.0 at $p > 0.5$. Organisms such as Salmonella spp., E. coli, and Klebsiella were the organisms isolated from suya obtained at the two local government areas with little variations in the type of organisms isolated in the suya in different areas. Based on the outcome of this study, it was recommended that government should set up a committee to monitor suya processing and also create an association under which all suya sellers will be registered to ensure safe condition for processing in other to prevent harboring of various organisms that cause diseases and are harmful to the health of man.

Keywords: *Salmonella Shigella Agar (SSA), MacConkey, Peptone water*

Background of the Study

Foodborne infection remains a major public health concern worldwide, contributing to the economic burden of both industrialized and underdeveloped countries through the costs associated with surveillance, prevention, and treatment of disease (Crump *et al*. 2004).

Suya is a spicy, barbecued, smoked or roasted meat product. Suya selling is an occupation common among the Hausa people of northern Nigeria, where rearing of cattle is an important preoccupation and a major source of livelihood for the people. Suya is known to be very popular street food and the consumption has extended to other parts of the country (Inyang *et al*., 2015). Suya vendors have become very prominent with their grill stands becoming very busy from about midday until late at night. It is gradually making its way into elite circles where it has become a delicacy served at parties.

Suya is prepared basically from boneless meat of animals (Abdullahi *et al*., 2014). The preparation process carried out under largely unhygienic conditions and the risk of

contamination is very high. The fact that there are sporadic cases of gastroenteritis and symptoms of food infection after consumption of suya indicate that the product indeed constitutes a food safety risk (Odusote and Akinyanju, 2013; Inyang *et al*., 2015). In developing countries, despite the sustainable disease surveillance and reporting, it is widely known that cholera, salmonellosis, campylobacteriosis, shigellosis, typhoid, brucellosis, poliomyelitis, and Escherichia coli infections are prevalent (WHO, 2013).

According to a study (Kirk *et al*, 2015) commissioned by the World Health Organization (WHO) on the global disease burden of foodborne diseases in humans, food-borne illnesses from diarrhea and invasive non-typhoidal Salmonella enterica, resulted in the largest disease burden, highlighting the significant public health importance of Salmonella infections and the urgency for control, particularly in low- and middle-income countries where most burdens of diseases and the occurrence of mortality cases are reported. Humans become infected with Salmonella after consuming raw or improperly cooked animal products, such as contaminated meat, poultry, pork, and milk, as well as through direct contact with contaminated animals and household pets (Stevens *et al*, 2014).

Typhoid has negatively magnified the socio-economic status of our nation; this is because

it kills young children and young adults in their productive years and leaves several other young children as dependents (Talabi, 1994). The high level of microbial flora on the meat could be generally attributed to the filthy environment, poor personal hygiene of the sellers. There could be possible cross-contamination between adjacent raw meat through unclean hands of the handlers and/or flies. The increasing numbers of bacteria recovered from samples over time could be due to growth and/or increasing numbers of bacteria being deposited on the carcass along with dust. Also, the hands and knives, gloves, aprons, cutting table surfaces used could be implicated as media for cross-contamination of the meat and spread spoiling organisms such as *Pseudomonas* and pathogens present on carcasses onto freshly exposed tissues and meat from other carcasses. Likewise, careless sneezing and coughing among sellers can lead to contamination of the products (Cunha, 2014). Therefore this study was set to identify different food pathogens that can be present in the Suya meat that is widely consumed in Nigeria and the necessary steps that can be taken in curbing the menace of consuming the meat on the health.

Materials and Methods

The sample of the suya meat used for the study was obtained from different "Suya" selling spots in Ijebu-Ode and Ijebu North East Local Government areas of Ogun State, Nigeria around June 2018.

MATERIALS USED

- Suya meat,
- Universal bottle,
- Peptone water,
- Petri dish,
- MacConckey agar
- Salmonella Shigella agar, (SSA).

Samples Collection

Twenty skewers of suya meat were obtained randomly from suya vendor at popular suya spots in the two local government areas in Ogun East senatorial districts. The samples were immediately wrapped in sterile aluminum foil to prevent contamination and then transported to the laboratory for microbial analysis without delay.

Preparation of Agar

MacConkey Agar

1. 55.07grams of macConkey salt was suspended in 1000ml of distilled water

2. It was dissolved in the medium completely

3. It was pressured (121^{0}C) for 15minutes

4. Overheating was avoided

5. Cool to 45-50^{0}c

Salmonella Shigella Agar (SSA)

1. 63.02 grams of SSA was suspended in 1000ml of distilled water
2. It was heated to boiling with frequent agitation to dissolve the medium.
3. Autoclave or overheating was avoided. Overheating may destroy the selectivity of the medium. Cool to about 50^{0}c, mix well and pour into sterile Petri dishes.

Peptone Water

15.0grams of peptone water was suspended in 1000ml of distilled water. It was mixed well and dispensed into tubes with or without inverted Durham's tubes and sterilize by autoclaving at 15ibs pressure (121^{0}c) for 15minutes.

Microbiological Analysis

In twenty (20) sterile bottles, peptone H_2O was put in each. Small piece of suya sample was put in each sterile bottle. Then soaked overnight. With the aid of a sterile wire loop, a little amount of the solution prepared overnight was picked.

On a prepared MacConkey agar, a primary inoculum was made. The wire loop was sterilized and the streak of district colony was made for inoculation on the medium. It was then incubated at 37^{0}c for 24hours.

On a prepared Salmonella Shigella Agar, a primary inoculum was made. The wire loop was sterilized. A streak of district colony was made for inoculation on the medium and the wire loop was sterilized. It was then incubated at 37^{0}c for 24 hours and the result was read after 24 hours.

Preparation of Chocolate Agar

28.0grams of nutrient salt was suspended in 1000ml distilled water; it was heated to boiling to dissolve the medium completely. It was sterilized by autoclaving at (121^{0}c) for 15 minutes and 5-10% blood was added. It was allowed to cool to 45-75^{0}C and mixed well and pour into sterile Petri dishes.

Result

This study was carried out to isolate organism presents in the suya meat sold within Ijebu-Ode and Ijebu North East Local Government Area of Ogun State.

Table 1: Isolation of pathogenic organisms from Suya meat

Sample areas	SSA	Mac	CA	Isolated organisms
Newmarket 1A	NG	G	G	Kleb
Newmarket 1B	G	G	G	Salmonella spp.
Oke-Aje 2A	NG	G	G	Kleb
Oke-Aje 2B	NG	G	G	Kleb
Epe-Garage 3A	G	G	G	Salmonella spp.
Epe-Garage 3B	NG	G	G	E. coli
Omolomo junction 4A	G	G	G	Salmonella spp.
Omolomo junction 4B	G	G	G	Salmonella spp.
Ibadan Road 5A	NG	G	G	Kleb
Ibadan Road 5B	NG	G	G	Kleb
Curry's 6A	NG	G	G	Kleb
Curry's 6B	G	G	G	Salmonella spp.
Central mosque 7A	G	G	G	Salmonella spp.
Central mosque 7B	G	G	G	Salmonella spp.
Lagos-Garage 8A	NG	G	G	Kleb
Lagos-Garage 8B	NG	G	G	Kleb
Oke-owa 9A	G	G	G	Salmonella spp.
Oke-owa 9B	NG	G	G	E. coli
Abeokuta Road 10A	NG	G	G	E. coli
Abeokuta Road 10B	NG	NG	G	E. coli

Table 1. above is a microbiological test of suya obtained from ten (10) different spots in the two local governments areas. The table revealed the growth of various organisms namely kleb, Salmonella spp. and E.coli in the sample of suya meat from different spot tested in various media.

KEYS

SSA --- Salmonella Shigella Agar
MaC--- MacConkey Agar
CA--- Chocolate Agar
NG--- No Growth
G--- Growth
+ ---- Positive
- ---- Negative
A ---- Day 1
B ---- Day 2
Kleb = Klebsiella ssp
E. coli = Escherichia coli
Sal = Salmonella spp

Table 2: ***Comparison of Microorganism Isolated from Different Suya Spot***

Suya Spot	Number of Samples	Salmonella spp.	E. coli	Kleb
Newmarket	2	1	-	1
Oke-aje	2	-	-	2
Epe-garage	2	1	1	-
Omolomo junction	2	2	-	-
Ibadan-road	2	-	-	2
Curry's	2	1	-	1
Central mosque	2	2	-	-
Lagos garage	2	-	-	2
Oke-owa	2	1	1	-
Abeokuta road	2	-	2	-
Total	20	8	4	8

The table above showed types of microorganisms isolated from suya obtained from ten (10) different places. Organisms such as Salmonella spp., E. coli, and Klebsiella were isolated. It was discovered that Salmonella spp was isolated from new market, Epe garage, Omolomo junction, Curry's, Central Mosque, and Oke Owa. E.coli was isolated from suya obtained from Epe garage, Oke owa and Abeokuta road while Klebsiella was isolated from suya obtained at Newmarket, Oke-aje, Ibadan road, Curry's and Lagos Garage.

Discussion

Suya is prepared under unhygienic conditions and this risk of contamination is very high. In most cases, consumption has led to sporadic cases of gastroenteritis and symptoms of food infection after consumption of suya which is an indication that the product indeed constitutes a food safety risk. Salmonella is also one of the major organisms obtained from suya obtained from different spots in Ijebu-Ode. According to the World Health Organization (2013), this has been one of the most commonly reported causes of food-borne pathogens from distant and recent times. Suya obtained from ten (10) different spots in Ijebu-Ode showed different microorganisms such as Salmonella spp., E. coli, Klebsiella. These organisms have been responsible for various infection and disease worldwide (WHO, 2013).

Three (3) different types of organism (E. coli, Salmonella spp. and Kleb) were isolated from ten different Suya bought from different spots and these organisms according to several authors are potential pathogens that caused several food infections. The findings from this study conform to the study of Odusote and Akinyanju, (2013) and that of Inyang et al., (2015) concerning food infection often caused by consuming suya obtained from different areas. According to the report of World Health Organization (WHO, 2013), there are diseases that can results from the infectious organisms from the suya which include cholera, salmonellosis, campylobacteriosis, shigellosis, typhoid, diarrhea, brucellosis, poliomyelitis, and Escherichia coli infections and all these are known to be prevalent.

The result shows that the suya prepared in this environment poses a big threat to the health of those that might be consuming it which may in turn affects the family at large because when one is sick, other members may be disturbed which may hinder them from going to work and this may affect their productivity level and even affect the government in the long run. It is, therefore, necessary for Government to set up a committee that will monitor how suya is processed in a various spot in Ijebu-Ode and environs, Ogun State. Beef used for suya processing should only be slaughtered at a registered and monitored abattoir. The government should create an association under which all suya sellers will be registered to ensure that they are orientated on how to process suya under safe conditions to prevent harboring of various organisms that cause diseases and are harmful to the health of man. Suya should always be covered to avoid contaminants.

References

1. Crump J.A, Luby S.P, Mintz E.D (2004), The global burden of typhoid fever. Bull World Health Organ. 82(5):346-353.
2. Inyang C.U, Igyor M.A, Uma E.N (2015). Bacterial Quality of a Smoked Meat product ('Suya'). Nig. Food J. 23: 239-242.
3. Abdullahi I.O, Umoh V.J, Ameh J.B, Galadima M (2014). Hazards Associated with Kilishi preparation in Zaria, Nigeria. Nig. J. Microbiol. 18(1-2): 338-345.

4. Odusote K.A, Akinyanju O.O (2013). Red suya syndrome – acute intravascular Administration and Control consumer safety bulletin 2(2): 20-24.
5. World Health Organization (2013). Fact Sheet. 139. Salmonella (non-typhoidal) http://www.who.int/mediacentre/factsheets/fs139/en/
6. Kirk M. D., Pires S. M., Black R. E. (2015). World Health Organization estimates of the global and regional disease burden of 22 foodborne bacterial, protozoa, and viral diseases 2010: a data synthesis. PLoS Medicine.;12(12)
7. Stevens M. P., Humphrey T. J., Maskell D. J. (2009); Molecular insights into farm animal and zoonotic Salmonella infections. Philosophical Transactions of the Royal Society of London B: Biological Sciences. 364(1530):2709–2723.
8. Talabi H.A (1994). Medical aspects of typhoid. Niger Postgrad Med J 1: 51-56
9. Cunha BA (2014). "Osler on typhoid fever: differentiating typhoid from typhus and malaria".
10. Infect. Dis. Clin. North Am. 18 (1): 111–25.

How to cite this Article: **Oladunjoye Z.M[1], Quadri J.A[2], Ojure M.A[3], Usiobeigbe O.S[4]** *Isolation of Pathogenic Organisms from Suya Meat Obtained from Selected Local Governments in Ogun East Senatorial District of Ogun State, Nigeria*,
Int. Res. Med. Health Sci., 2019; 2(3): 1-7.
Source of Support: Nil, Conflict of Interest: None declared.