



Isolation and Biochemical Characterization of Methicillin Resistant *Staphylococcus aureus* from Poultry Carcass Rinse in Sokoto Live-Birds Market Slaughter Section

Farida Abubakar*

Usmanu Danfodiyo University Sokoto, Nigeria

*Corresponding Author: Farida Abubakar, Usmanu Danfodiyo University Sokoto, Nigeria.

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Abstract

This study was carried out in Sokoto state Nigeria, to determine the prevalence of MRSA in poultry carcass rinse. A total of 122 samples of poultry carcass rinse were taken using distilled water to carefully rinse poultry carcass and safely transport the carcass rinse to the laboratory for inoculation. Three samples of Tap water used in the slaughter slab was also taken, one before and one after rinsing broiler chicken was taken and another sample after rinsing local chicken was taken. Out of the one hundred and twenty-two samples collected, 37.7% (46/122) were positive on Mannitol salt agar for *S. aureus* out of which 42.6% (26/61) of broilers were positive for *S. aureus* and 32.8% (20/61) of local chicken are positive for *S. aureus*. Following subculture on Oxacillin Resistance Screening Agar Base (ORSAB), 30.3% (37/122) were positive out of which 39.3% (24/61) were broilers and 21.3% (13/61) were local chickens. From the three samples of Tap water used in the slaughter slab, one from broiler chicken and one other from local chicken were all positive on Mannitol salt agar and ORSAB and the sample of water before being used for carcass rinse was positive for *S. aureus* on Mannitol salt agar and negative on ORSAB.

Keywords: Mannitol Salt Agar; Methicillin Resistance Screening Agar Base; Local Chicken; Broiler Chicken; Slaughter Slab; *Staphylococcus aureus*

Abbreviations

MRSA: Methicillin Resistant *Staphylococcus Aureus*

Introduction

Staphylococcus aureus is among the species of *Staphylococcus* that may be present as a commensal but is an opportunistic pathogen that cause disease through toxin production [12,13]. The continue emergence of antibiotic resistant. *S. aureus* strain in particular methicillin resistant *S. aureus* (MRSA), it has presented a growing problem of significant in medicinal science [14]. Beyond foodborne gastroenteritis, the contamination of meat has been suspected in cases of MRSA skin infections [6,7]. Recently, pigs were shown to be major reservoir for MRSA multi-locus sequence type 398 (ST398). Because this sequence type has also been isolated from other farm animal species, it is referred to as livestock-associated MRSA [4]. It has also shown potential for zoonotic transmission [10]. In one particular incident, a processing plant worker became infected with a strain of MRSA [11]. The worker handled

swine carcasses on a daily basis, and the MRSA strain that infected the worker was associated with the swine carcasses. MRSA has also been isolated from raw chicken meat or carcasses in Korea [8,9] and in Japan [5]. However, these strains were human associated not livestock. Thus, the possibility of human contamination cannot be ruled out and because *S. aureus* is present on the skin of many agriculturally important animals the risk of carcass contamination exist [11]. Poultry may present a higher risk than either cattle or swine because the skin is left intact on many cuts of poultry but is removed in cattle and swine. This study will provide microbiological evidence of the presence of MRSA in poultry carcass wash. Poultry carcasses are taken with intact skin but beef typically is not. Thus, the risk of MRSA of human infection from whole raw poultry carcass may be greater than that of beef. Though presence of MRSA in the nostrils of meat sellers screened in the study conducted by [19] predict potential dangers to the sellers, their families and the general public due to versatility and severity of this organism in human infections.

Materials and Methods

Sample collection

200ml of distilled water was dispensed in a sterile polythene bag, a dressed chicken was inserted into the polythene bag containing the water. The polythene bag was closed and shaken vigorously for about 45 seconds and the bag is opened, the chicken is removed. The water is carefully poured into a sterile sample bottle and the bottle is closed properly. Sample bottle labelled appropriately indicating the sample identification and type of chicken sampled. Sample is taken to the laboratory for inoculation.

Materials

Culture Media

Nutrient agar (NA), mannitol salt agar (MSA), oxacillin resistant screening agar base (ORSAB), were all from Oxoid Ltd, England. All media were prepared according to manufacturer's instruction, sterilized at 121°C for 15 minutes.

Chemical reagents

Distilled water.

Plasma

Undiluted, cow blood was collected from the Sokoto State modern abattoir and centrifuged to extract plasma and then used as required.

Equipment

Autoclave (portable), Refrigerator, Centrifuge, Weighing Balance, Incubator, Hot plate, Hot air oven, Petri-dish, Glass slide, Sample bottles, Aluminum foil, Hand gloves, Conical flask(500ml), Cotton wool, EDTA bottles, Masking tape, Measuring, cylinder, Wire loop.

Sample Collection Area

Sokoto live-bird Market slaughter section.

Sample Size Calculation

$$n = \frac{Z^2 pq^2}{d^2}$$

where; d = degree of freedom or margin of error = 5% ÷ 100

Z = percentage point of the normal distribution corresponding to the required (two sided) significance level of (α) of 0.05 = 1.96

P = prevalence from previous study = 14.29% ÷ 100

q = complimentary probability of p = 1-p

from above formula; d = 0.0025, Z² = 3.8416, P = 0.1429, q = 0.8571

$$n = \frac{3.8416 \times 0.1429 \times 0.8571}{0.0025}$$

n = 188.21

Results and Discussion

In this study, the prevalence of *S. aureus* in poultry carcass wash was found to be 37.7% (46/122). Among the isolates, 30.3% (37/122) were MRSA, broiler chicken has a higher occurrence of *S. aureus* than local chicken and also a higher occurrence of MRSA than local chicken. This report nearly agrees with the work [19], who recorded a MRSA prevalence of 14.29% in farm personnel but lower than that of [20] who reported 83.3% occurrence among poultry farm workers in south-western Nigeria during an outbreak of diarrhea and attributed the high incidence to the on-going disease condition. The occurrence of MRSA in poultry in this study could also be due to indiscriminate administration of antibiotics to food animals by farmers without prescription by a veterinarian which is a common practice in Nigeria as documented by [17,18]. Similar patterns of antimicrobial susceptibility have been reported in Nigeria [15] and such other countries as Italy [16], United States [1] and Ireland [10] where occurrence of multidrug resistant *S. aureus* in poultry is rather frequent. This finding may be reflective of the extent of poor drug control and legislations concerning sales of antimicrobials in Nigeria [3].

Conclusion

The detection of Methicillin resistance staphylococcus aureus in poultry carcass wash indicates that the poultry meat is unwholesome for consumption and the people of Sokoto metropolis are at risk of staphylococcal infection for food poisoning.

Although the MRSA is at a minimal level in broiler and less in local chicken, the use of antibiotic therapy should be limited in poultry farming. Also, withdrawal period for antibiotics should strictly be adhered to before slaughter.

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Conflict of Interest

I declare that this work was carried out by me and there are no conflict of interest or financial interest.

Bibliography

1. Waters AE., et al. "Multidrug-resistant *Staphylococcus aureus* in US meat and poultry". *Clinical Infectious Diseases* 52 (2011): 1227-1230.
2. Brown DF., et al. On behalf of the joint Working Party of British Society for Antimicrobial chemotherapy, Hospital Infection Society and infection Control Nurses Association (2005). "Guidelines for the laboratory diagnosis and susceptibility testing of methicillin resistant *S. aureus* (MRSA)". *Journal of Antimicrobial Chemotherapy* 56 (2005): 100-1018.
3. Geidam YA., et al. "Patterns of antibiotic sales by drug stores and usage in poultry farms: a questionnaire-based survey in Maiduguri, Northeastern Nigeria". *Journal of Animal and Veterinary Advances* 11.16 (2012a): 2852-2855.
4. Huijsdens XW., et al. "Community acquired MRSA and pig farming". *Annual Clinical Antimicrobial Chemotherapy* 26 (2006): 1476-1486.
5. Kitai S., et al. "Characterization of Methicillin-resistant *S. aureus* Isolated from retail raw chicken meat in Japan". *Journal of Veterinary Medicine* 67 (2006): 10.
6. Kluytmans JA., et al. "Nasal carriage of *S. aureus* Epidemiology, underlying mechanisms and Associated risk". *Clinical Microbiology Review* 10 (1997): 505-520.
7. Kluytmans JA. "Methicillin resistant *S. aureus* in food products: cause for concern or case for complacency?" *Clinical Microbial Infections* 16 (2006): 11-15.
8. Lee JH. "Occurrence of methicillin-resistant *S. aureus* strains from cattle and chicken and analyses of their *mecA*, *RI* and *I* genes". *Veterinary Microbiology* 114 (2003a): 155-159.
9. Lee JH. "Methicillin (oxacillin)-resistant *S. aureus* strains isolated from major food animals and their potential transmission to humans". *Applied and Environmental Microbiology* 69.II (2003b): 6489-6494.
10. Leonard FC and Markey BK. "Methicillin-resistant *Staphylococcus aureus* in animals: a review". *The Veterinary Journal* 175 (2008): 27-36.
11. Lewis HC., et al. "Pigs as source of methicillin-resistant *Staphylococcus aureus* CC398 infections in humans, Denmark". *Emerging Infectious Diseases* 14.9 (2008): 1383-1389.
12. Lowy FD. "*S. aureus* infections". *New England Journal Medicine* 339 (1998): 520-532.
13. Lowy FD. "Antimicrobial Resistance: the example of *S. aureus*". *Journal of Clinical Investigation* II.9 (2003): 1265-1273.
14. Moran GY., et al. "Methicillin resistance *S. aureus* infections among patient in the emergency dept". *African Journal of Clinical and Experimental Microbiology* 14 (2006): 1-4.
15. Olatu OJ., et al. "Multi-drug Resistant Coagulase Positive *S. aureus* from Live and Slaughtered Chickens in Zaria, Nigeria". *International Journal of Poultry Science* 10.11 (2011): 871-875.
16. Pesavento G., et al. "Antimicrobial resistance profile of *Staphylococcus aureus* isolated from raw meat: a research for methicillin resistant *Staphylococcus aureus* (MRSA)". *Food Control* 18 (2007): 196-2000.
17. Broens EM., et al. "Longitudinal study on transmission of MRSA CC398 within pig herds". *BMC Veterinary Research* 8 (2012): 58.
18. Broens EM., et al. "Prevalence and risk factor analysis of live-stock associated MRSA-positive pig herds in The Netherlands". *Preventive Veterinary Medicine* 102.1 (2011): 41.
19. ID Kwoji. *Journal of Advanced Veterinary and Animal Research* 4.3 (2017): 255-260.

20. Adeyeye J OKE and Adewale A. *OKE IOSR Journal of Agriculture and Veterinary Science* (2013); 2319-2380.

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