

Original Research Article

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Monitoring of Antibiotic Residues in Poultry Meat in Khartoum State

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ABSTRACT

This study was designed to monitor antibiotic residues in tissues of poultry from Khartoum state. A total of 360 tissue samples, (muscle, liver and kidney) were collected randomly from the market in Omdurman, Khartoum and Bhari localities. The samples were taken in summer, autumn and winter seasons (each season 120 samples). One plate test was used to detect the inhibition zone of the *bacillus sibilus*. The result revealed that 52 (14.4%) samples were positive after screening and 308 (85.6%) were negative. Muscle tissue showed high percentage (18.8%) than liver and kidney (15.0%). The positive samples obtained from Omdurman, Khartoum and Bhari were 20 (16.6%), 18 (15.0%), 14 (11.6%) respectively. The positive samples in summer were higher (35.8%) than autumn (10.8%) and winter (6.6%). The importance of this study is to develop monitoring system for controlling of antibiotic residues in poultry industries to save human health and to minimize drug resistance.

Keywords

Antibiotic
resistance, Poultry
meat, Human,
Monitoring

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Introduction

Chicken and poultry products have been distributed worldwide because of being healthier than other animal products. The white meat is an important in animal food market to satisfy world demand (Bryan, 1980). Drugs residues have been noted are accumulated usually in liver or kidney and

different tissues as site and route of administration (Doyle, 2006). The residues of these substances can be present in edible tissues, milk and eggs causing toxicity to consumers with anemia, hypersensitivity and resistance to antibiotic (Suhren *et al.*, 1996). In Sudan, there is increased in poultry industry. The antibiotic are used as routine practice is non avoidable to prevent economic

loss due to diseases and consequent mortality (Hind *et al.*, 2014).

Antibiotic abuse can be occurred in unnecessary over prescribed, employed in wrong combination, changed quickly over to other drugs, used persistently, given in adequate dosage, giving in self-medication, used for preventive purposes and employed as unauthorized (Khan, 1975). Because of these applications, antibiotic residues accumulated in various body tissues, examples muscles, liver and kidneys (Ayres and Krafi, 1964) and eggs of birds (Blom, 1975). The therapeutic and growth promoting antibiotics are the sources of residues in broiler meat if proper withdrawal period is not provided before slaughter the bird the results the meat can be reached to the consumer (Coulson, 1984).

Microbial growth inhibition tests are widely used as the primary screening approach for the detection of antibiotic residues in tissues (Pikkemaat *et al.*, 2011). Antibiotics are used by poultry industries and poultry veterinarians to enhanced growth, feed efficiency and reducing disease. Antibiotic usage has facilitated the production of poultry, allowing the consumer to purchase, as a reasonable cost, high quality meat and egg (Karmi, 2014). The antibiotics are used as routine practice in non-avoidable to prevent economic loss due to the disease and consequent motility (Hind, *et al.*, 2014) residue of these substance can be present in edible tissue, milk and eggs causing toxicity to customer with anemia, hypersensitivity and resistance to antibiotics (Suhren *et al.*, 1996). Drugs residue has been noted accumulated usually in liver or kidney and different tissue as site and route of administration (Doule, 2006).

Many sensitive methods were optimized and validated for detection and determined of different antibiotic residues in animal meat and poultry such as high-performance liquid chromatography (HPLC), liquid

Chromatography (LC), liquid Chromatography-mass spectrometry (LCMS), thin layer Chromatography (TLC), for plate test (FPT) (Karmi, 2014).

The microbiological inhibition tests were the earlier test used and are still in use because they are expensive and can cover entire antibiotic spectrum, but are less specific than other tests (Hind, *et al.*, 2014). The main objective of this study was to screen the preset of the antibiotic in muscles, liver and kidney as important poultry tissues in Khartoum State.

Materials and Methods

Study area

The samples were collected from local market in Omdurman, Khartoum and Bhari localities in Khartoum State.

Sampling

A total of 360 poultry liver, muscle and kidney were taken randomly from local market of the three localities seasonally (summer, autumn and winter) in sealed bags and stored in ice till transported to the Central Veterinary Research Laboratory

Preparation of plate

Nutrient agar (28g) were prepared (Oxoid, 2006) by suspending in one liter distilled water and dissolving completely in boiling water bath then sterilized by autoclave at 120b for 15 minutes and then cooled to 47°C.

Assay

Poultry tissues were screened or antibiotic residues using the microbial inhibition plate test described by Korean-Dierick *et al.*, (1995) with some modification. The organism was used in this test *Bacillus subtilis* (TCC6633),

one colony from each fresh culture was taken by sterile loop under flame then diluted in 9m sterile normal saline the suspension were shaken by vortex mixer to be homogenized, then adjusted to 0.5 McFarland standard turbidity (equivalent to 3×10^8 cell/ml). One drop of this mixer was cultured to the plate by using sterile loop under flame, then the tissues were cut into small portion (dimension) and bled and then incubated overnight. The tested samples were read by inhibition zone of their diameter 2mm or more (Tajik *et al.*, 1998; WahatAlla *et al.*, 2011).

Statistical analysis

Data collected was analyzed using descriptive methods. Frequency showed the occurrence of the observation in this data.

Results and Discussion

As shown in table 1 all samples were detected by microbial inhibition one plate test and the positive to antibiotic were 52 (14.4%) and the negative were 308 (85.6%). Muscle tissues revealed high percentage (18.0%) inhibition zone than liver and kidney (15.0%).

The results showed that (Figure 1) positive samples in Omdurman were 20 (16.6%), Khartoum was 18 (15.0%) and Bahri were 14 (11.6%). These organs in Omdurman locality were contained high concentration of antibiotics than other two localities.

Also in this results the number of positive sample to antibiotic were 31 (25.8%) in summer while in autumn were 13 (10.8%) and in winter were 8 (6.6%).

From this result the usage of antibiotic was increased in hot seasons than cold seasons. In Sudan there is little data concerning the presence of antibiotic residues in the food sold

for human consumption. The present study using one plate test for monitoring antibiotic residue revealed considerable percentage in poultry tissues collected from local market in Khartoum state. This result was in agreement with that done by Hind *et al.*, (2014), who found 27% positive samples and Hala (2006) observed a high percentage (16.87%) in poultry.

In the present result when different tissue samples were tested, muscles (18.8%) showed high percentage than livers and kidneys. This result was similar to that obtained by Hind *et al.*, (2014) and Palvlov *et al.*, (2008), while Hala (2006) found that lower percentage of positive sample was detected in muscle and liver compared to kidneys for poultry tissues in Khartoum. Muhammad and Khalida (2006) stated that liver and kidney had a higher residue percentage than muscles and eggs. Also, Shahid *et al.*, (2007) found high percentage of positive samples in liver, kidney and muscle respectively. Ahmed *et al.* (2015) found higher positive samples in liver sample than in muscles with no significant difference. The distribution of antibiotic within broiler tissues concentrated more in breast or high muscles (Reyes and Donoghue, 2008).

Our result revealed that the positive samples in summer were higher than autumn and winter (Fig. 2). While Palvlov *et al.*, (2008) found a higher percentage in winter in Bulgaria. This may be attributed to that Sudan is a tropical country and summer is known as hottest season that increases the growth of the microorganism and lead to increasing the usage of antibiotic for prevention of acute and sub-acute bacterial infections. Omdurman locality represents higher percentage than Bahri and Khartoum (Fig. 1), while Ahmed (2015) found 8% in Khartoum, 4% in Bahri and 0% in Omdurman locality.

Table.1 Percentage of Poultry liver, muscle and kidney (360) in Khartoum State

Samples	Frequency	Percent
Positive	52	14.4
Negative	308	85.6
Total	360	100.0

Fig.1 Distribution of antibiotic residues in poultry meat (360) in Khartoum State

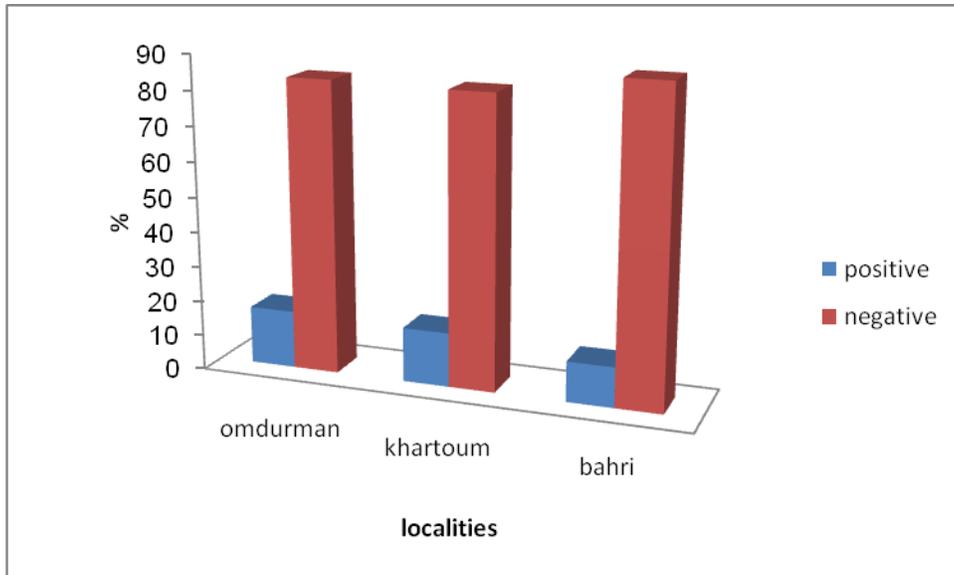
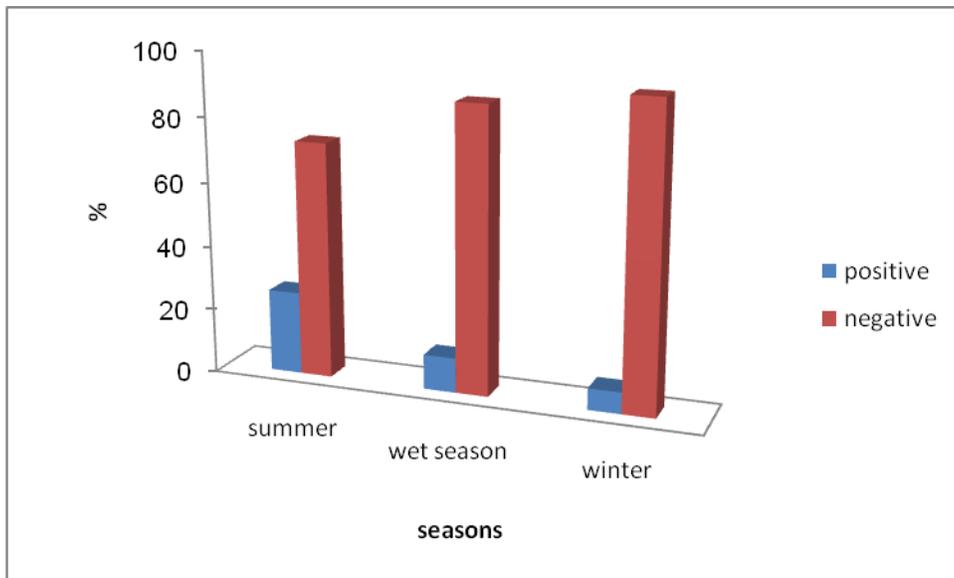


Fig.2 Seasonal variation of antibiotic residue in poultry meat (360) in Khartoum state



In Sudan more than 80% of veterinarians did not determine animal weight when describing doses, no following up of cases after leaving the clinic, slaughtered animals during treatment without completing withdrawal periods (Mohammed *et al.*, 2011).

In poultry industries the producers used a variety of products to control diseases and increase yields. The risks of residues in foodstuff from animal origin could be reflected into several forms, carcinogens, allergies toxicity alteration of the intestinal flora, bacteria resistant (Wageh *et al.*, 2013; Mohamed *et al.*, 2019). The risk of violative drug residues is minimized when treatment protocols are carefully followed. Therefore, poultry industries have started to enhance the production of meat using enriched feed for disease prevention (Mehdi *et al.*, 2018).

In conclusion, the antibiotic abuse is most important cause of high prevalence of residue and large number of resistant bacteria. Developing monitoring system for screening residues in food is an important issue now a day to produce food and to meet the international standard to enhance international trade.

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