

Original Research Article

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## Prevalence of Antibiotic Residue in Sheep Meat in Khartoum State, Sudan

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### ABSTRACT

#### Keywords

Antibacterial agents, veterinary, agricultural

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The incidence of antibiotic residues in meat is considered a serious hazard to public health. This work was conducted to detect antibiotics residues among sheep' meats in Khartoum state, Sudan. From July to December 2018, a total of 100 samples were collected from El-Shaheed Nasr El-din slaughterhouse in Khartoum state and analyzed by the laboratory examination using One Plate Test (O. P. T) was used. The overall prevalence of antibiotics residues was 53% of the samples positive and 47% of them negative while the inhibition zone distribution for highest result was 26.4 for the 2MM. In conclusion, the presence of antibiotic residue among sheep meats in Khartoum state is high.

### Introduction

Antibiotics, also known as antibacterial agents, are powerful secondary metabolites that have properties to fight certain infections by destroying bacterial cells or by preventing their replication. These metabolites play essential roles in veterinary, agricultural, and clinical fields. Moreover, they are extensively used in food-producing animals for prophylactic, therapeutic, and metaphylactic purposes (Singh *et al.*, 2019; Sarker *et al.*, 2018). Adult sheep are typically slaughtered around two to three years of age (Polidori *et al.*, 2011; Ivanović *et al.*, 2016). Antibiotic residues remain in tissues and

organs of slaughtered animals and birds that have been given antibiotics previously without adherence to the withdrawal period (WP) of the antibiotic. Moreover, such residues may also be found in milk and eggs. The misuse and overuse of antibiotics in veterinary field lead to accumulation of large amounts of residues posing a serious threat to human health and economy after consuming contaminated meat tissues and organs. This problem is exacerbated by the lack or shortage of information among animal breeder about withdrawal periods of antibiotics. The incidence of antibiotic leftover in food of animal origin above the maximum residue limits (MRLs) is considered globally by different

public health authorities as being illegal (Jayalakshmi *et al.*, 2017; Li *et al.*, 2019).

Based on FAO data, Sudan is the first to third among all African countries in the number of cattle, sheep, goats, and camels, third in the number of poultry and fifth in the number of donkeys (Ahmed, *et al.*, 2020). The sheep population of Sudan is about 49 million over 36 % of the livestock in the country (El-Hag *et al.*, 2007). Many livestock producers treat their animals by themselves.

Even if they use the same drugs as veterinarians, they have little understanding of the conditions and quantities to administer or the waiting periods. In addition, there are cases of veterinary medicinal products intended for ruminants being administered to other species (poultry). The uncontrolled use of anti-infectious agents in general and antibiotics in particular, can lead to residues in animal products, especially when users fail to respect waiting periods.

The risks of residues in foodstuffs of animal origin could be reflected into several forms, carcinogens, allergies toxicity alteration of the intestinal flora, selection of bacteria resistant to antibiotics (Khan, 1975; Wageh *et al.*, 2013). Antibiotics residues is causes harmful effects including bacteria resistance, allergies, toxicity, kidney failure and other side effects that lead to death (Mc Evoy, 2002).

The study was carried out to investigate prevalence of the antibiotic residues in sheep meat in Khartoum State, Sudan.

## **Materials and Methods**

### **Study Area**

Khartoum state is the national capital and the largest city of Sudan it's located at the confluence of the White Nile and the Blue Nile the two Niles unite to form the river Nile. The state lies between longitudes 31.5 to 34 E and the latitude 15 to 16 N. It consists of three city Khartoum, Khartoum north and Omdurman.

### **Sample collection**

A total of 100 samples (muscle samples) were collected from sheep carcasses from El-Shaheed Nasr El-din slaughterhouse in Khartoum state Approximately 50 to 100 gm of labeled muscle samples obtained from each sheep carcass was wrapped in polythene bags and put in cool boxes with dry ice or freezer packs at 4 oC. The samples were stored at -20oC until analyzed.

### **One Plate Test**

One Plate Test (O. P. T) was used as described by Koenen –Dierick *et al.*, (1995) and Nada (1996): Briefly samples were screened for antibiotic residues using the microbial inhibition plate test.

The standard test organism *Bacillus subtilis* strain NCTC8236 was obtained from National Laboratory for Public Health, Ministry of Health, Sudan. The test depends on bacterial growth inhibition. The sample was considered to be positive when the inhibition zone appeared around the well.

Test Procedure: 1 mL of standard organism was added to 20 mL of nutrient agar in each Petri dish. Then mixed and left for 10 min to solidify on a leveled surface bench. Four cups (10 mm in diameter) were cut using sterile cork borer (No.4) and the agar discs were removed.

Alternate cups were filled with 0.1ml each of samples using automatic micro pipettes and allowed to diffuse at room temperature for 2 hours. Plates were incubated at 37°C over night until growth is visible within. Zone inhibition was observed around the wells when the sample containing antibiotic and was measured in millimeter using a ruler. Negative samples did not show such clear zone.

### **Data analysis**

Data collected were subjected to Statistical analysis using SPSS version 24 software. Chi square test was used to find the P-value.

**Results and Discussion**

Out of 100 raw sheep meat samples, positive samples comprised was 53%. (53) and negative one was 47% (47) (Table.1). The extensive use of antimicrobials in livestock production might lead to several public health implications when contaminated meat is consumed by human. In this study 53% of sheep meat were found positive for antibiotics residues and 47% were found negative (table 1).

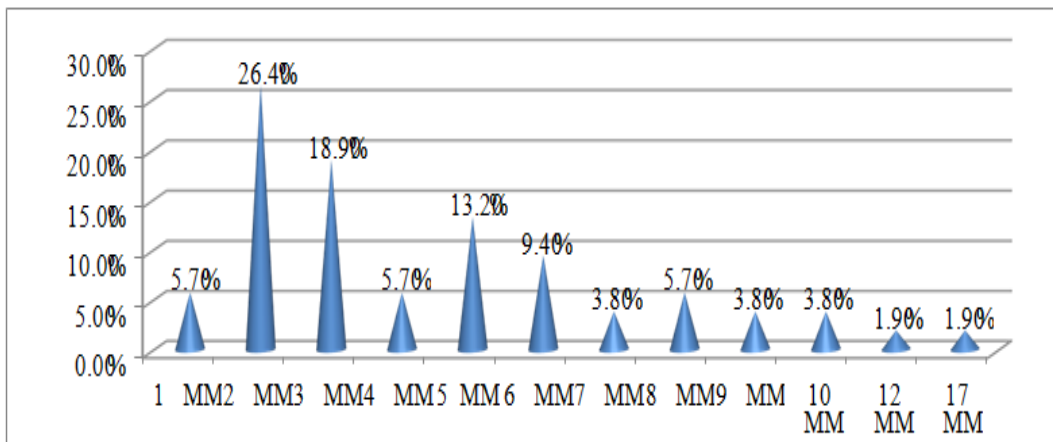
These results are nearly the same as the results of Tajick and Shohreh (2006) also found more than 50% of poultry meat tissues tested in Iran had residues of antimicrobials, also there was other

result done by Er *et al.*, (2013) it's close to our findings, their result was in the broiler meat and beef sold in the markets of Ankara, turkey they are discovered that 45.75% of chicken and 57.7% of beef were positive for quinolone residues, Olatoye and Ogundipe (2009) they are reach to the nearly result 56.0% of muscle sample was positive for antibiotics residues-(bashorun) 50.0% of muscle samples positive (low road) 60.0% of muscle samples positive and (apata slab) 56.6 % of muscle samples positive but Al-Mashhadani, (2020) found the lower result which is 10.4%, this variation may be coming from the high uses of the antibiotics for the treatments of the diseases, and the high care of the breeders their animals because its represent the main source of the income.

**Table.1** The frequency and percentage of positive and the negatives prevalence of antibiotic restudies in sheep meat in El-Shaheed Nasr El-din slaughterhouse at Khartoum state

Valid	Frequencies	Percentage
<b>Positive</b>	53	53.0%
<b>Zero</b>	47	47.0%
<b>Total</b>	100	100.0%

**Fig.1** Describing the Inhibition Zone of the distribution of the drug residues (Positive) reading sample by 1 MM by (%5.7) and 2 MM by (%26.4) and 3 MM by (%18.9) 4 MM by (%5.7) and 5 MM by (%13.2) and 6 MM by (%9.4) and 7 MM by (%3.8) and 8 MM by (%5.7) and 9 MM by (%3.8) and 10 MM by (%3.8) and 12 MM by (%1.9) and 17 by (%1.9) .



The inhibition zone measurement, were lied on the negative value was less than 2 MM and 2MM to up for the positive value and in the diagram (1) the

Inhibition Zone for the distribution of the drug residues (negative) reading 1 MM was (%5.7) and the higher incidence of the residue was 26.4% for

the 2 MM and 18.9% for the 3 MM but the lower value was 1.9% for the 17 MM.

The inhibition zone for ovine (>2 mm) for liver, kidney and muscle was, 15, 6 and 12, but the inhibition zone (1-2 mm) 6-15.

The result, showed detectable levels of antibiotic residues and that happened by the reason of the widespread of the antibiotic misuses in the farms and this indicate the level of danger to human and animal health.

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