Comparative Studies of Food Poisoning *Salmonella* among Slaughtered Animals.

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Abstract:

Salmonella is one of the major zoonotic foodborne pathogens worldwide. The presented study find out that the level of *Salmonella* contamination on cattle skin excision, fresh carcasses, liver, kidney and swabs after transportation and display at abattoir and butcher shops at Sharkia Governorate, Egypt. A total of 444 fresh Cow (50), Buffalo (48) and Camel (13) carcasses represented by Liver, Kidney, Swab and Skin excision samples The collected samples were subjected to isolation and identification of *salmonella*. Rate of resistant of the streptomycin was 100%, 96.2% for erythromycin, cefotaxim (80.8%), nalidixic acid (69.2%), sulphamethoxazol (65.4%), chloramphenicol (53.8%) and amikacin (50%). On contrary the sensitivity was 96.2% for gentamicin, (84.6%) ciprofloxacin, (73.1%) ampicillin and 76.9% for kanamycin . The high level of resistance may be due to many bacteria come in a close contact with many types of antibiotics miss used in animal medication, these processes contribute to resistance by overexposing cultures to these bactericidal or bacteriostatic chemicals. The data showed that 71.4 % of *S. Typhimurium* isolates displayed five or more antimicrobial resistant profiles . 80 % of *S. Enteritidis* isolates displayed five or more antimicrobial resistant profiles, 75 % of *S. Infantis* isolates displayed five or more antimicrobial resistant profiles. Furthermore, multiple antibiotic resistance (MAR) index of isolated *Salmonella species* ranged from 0.143 to 1 with an average of 0.483.

The MAR index results higher than 0.2 could be due to a contamination from high-risk sources, such as farm animals frequently exposed to antibiotics, resulting in potential risk to consumers. The reduction percent of the used disinfectants increased by the time to reach 100% or nearly approach it in a case of most used disinfectants. Besides alkadox followed by aldekol were the most superior disinfectant while, swift was the least one.

1.Introduction

Meat and edible organs are considered as an excellent source of high quality animal protein, vitamins especially B complex, especially iron **(Gracy, 1986)**. Foodborne diseases pose a major Public Health problem because of the increasing number of episodes, the emergence of new forms of transmission, the appearance of vulnerable population groups, the increasing pathogen resistance to antimicrobial compounds, and their socioeconomic impact **(Prado et al., 2002; Ruttler et al., 2002).**

Salmonella is one of the major zoonotic foodborne pathogens worldwide. It can cause avariety of clinical manifestations from mild gastroenteritis to bacteremia and typhoid fever. the global burden of nontyphoidal salmonella gastroenteritis has been estimated to be 93.8 million cases of gastroenteritis each year, with 155000 deaths **(Majowics SE et al., 2010)** *Salmonella* species are aleading cause of acute gastroenteritis in several countries,and salmonellosis remains an important public health problem worldwide, particularly in the developing countries **(AddisZ et al., 2011).** The presence of *salmonella* in food animals at slaughter and the consequent cross-contamination of edible carcass present asignificant food-safety hazard **(Kikuvi et al., 2010).** Foodborne bacterial contamination of meat is responsible for several thousand illnesses per year in Egypt. The primary means of reducing or

preventing this type of disease is to identify the sources of contamination and minimize or remove the sources from the production process. skin excision, fresh carcasses have been consistently implicated as the main source of the foodborne pathogens that contaminate carcasses **Barkocy-Gallagher et al. (2003)**, **Barkocy-Gallagher et al. (2001)**, **Bosilevac et al. (2004) and Nou et al. (2003).** In response to this finding, various forms of antimicrobial interventions targeting cattle skin excision, fresh carcasses have been developed. These interventions have been implemented in commercial beef processing facilities and have been effective for reducing carcass contamination **Arthur et al. (2007) and Bosilevac et al. (2005)**. However, even after the implementation of these interventions, pathogenic bacteria are still found in ground beef, possibly indicating that other sources of these bacteria may be present. Possibility of contamination of meat products with food poisoning bacteria especially *Salmonella* organism has been extensively reported **(Reham, 2004; Erdem et al., 2005).** *Salmonella* has been associated with a number of food-producing animals, which makes animals and their products important sources of human infections **(Acha & Szyfres 2001; Davies, Dalziel & Gibbens 2004).** The risk of *Salmonella* contamination may be present at any stage of food animal production ranging from the live animal to environmental factors **(Alexander, Warnick & Wiedmann 2009; Troutt & Osburn, 1997).** At the farm level, cattle hides may become exposed to Salmonella through contact with contaminated faeces, feed, or the environment, which poses a risk to food safety if these organisms are transferred on the carcass

Antimicrobial-resistant *Salmonella* is increasing due to the use of antimicrobial agents in food animals at sub-therapeutic level or prophylactic doses which may promote on-farm selection of antimicrobial resistant strains and markedly increase the human health risks associated with consumption of contaminated meat (**Forough et al., 2013)**. Antimicrobial compounds have been used to treat bacterial infections since the middle of the twentieth century. These compounds were highly successful in treating various diseases and were widely used in both human and veterinary medicine. However, resistance to these compounds was detected in target pathogens only a few years after initiation of therapeutic use in humans **(Alanis, 2005)**. Control of antibiotic resistant *Salmonella* is most efficiently through the reduction of consumption antibiotic. Control of animal feed, husbandry, hygiene in abattoir routinely, sanitation at all stages and food services are ways to minimize the need for antibiotic treatment **(Leila, 2012)**. Good manufacturing practices in processing plants may reduce final product contamination, and the control of critical points is essential along the entire production chain **(Bailey et al., 2001)**. One of the mechanisms adopted in the control of critical points to control and to reduce the presence of Salmonella spp during carcass processing and in the finalproduct is the use of disinfectants. A wide range of active principles,such as chlorine, quaternaryammonium, glutaraldehyde, and iodine, isavailable for the use in meat production, bothduring rearing andprocessing. The expected efficacy of disinfectants depends on their correct application, considering recommended dilutions, time of contact withthe surface to be sanitized,previous removal of organic matter, the quality of the water used for cleaning, and general characteristics of the action of disinfectants **(Martinez et al., 1999)**, in addition to product concentration, and environment temperature and pH **(Merianos,**

2 -MATERIALS AND METHODS

2.1. Collection of samples:

A total of 444 samples were collected (50 liver , 50 Kidney ,50 Swab and 50 skin excision) from cattle, (48 liver , 48 Kidney ,48 Swab and 48 skin excision) from camel and (13 liver , 13 Kidney ,13 Swab and 13 skin excision) from buffalo animals carcasses including of cattle, buffalo and camel. All samples collected from different butchers shops and abattoir of different sanitation levels at Sharkia government well identified , packed in sterile plastic bags then labeled and immediately transferred under sanitary precaution to the laboratory respectively.

2.2.Antibiotic Resistance of *Salmonella* species (Antibiogramme)

Antimicrobial susceptibility was tested by the single diffusion method according to **Srivani (2011)** for *Salmonella* species. Sensitivity discs with variable concentrations were used to determine the susceptibility of the isolated bacterial strains **(**Oxoid Limited, Basingstoke, Hampshire, UK). Agar plate method was applied by using of nutrient agar as a substrate for growth of the tested bacterium for its antibiotic sensitivity. The bacterial culture was uniformly spread on the surface of nutrient agar. Then the antibiotic discs were placed over the surface of inoculated plate. Moreover, the plate was then incubated at suitable temperature (25°C) for 2-7 days and checked for the growth of the bacterium around the antibiotic discs. The maximal inhibition zone for the growth of microbe is said to that antibiotic had maximum effect on the microbe growth. Therefore, the antimicrobial susceptibility testing was applied according to the guidelines stipulated by **National Committee for Clinical Laboratory Standards "NCCLS" (2001)**. Accordingly, the antimicrobial discs and their concentrations as well as the diameters of the zones of inhibition for the tested strains are demonstrated in the following table:

Supplementary table (1): Antimicrobial discs, concentration and interpretation of their action on the isolated *Salmonella* species.

Antimicrobial agent	Sensitivity disc content (ug)	Resistant (mm)	Intermediate (mm)	Susceptible (mm)
Ampicillin (AM)	10	13 or less	14-17	18 or more
Nalidixic acid (NA)	30	13 or less	14-18	19 or more
Tetracycline (T)	30	14 or less	15-18	19 or more
Gentamicin (G)	10	12 or less	13-14	15 or more
Kanamycin (K)	30	13 or less	14-17	18 or more
Ciprofloxacin (CP)	5	15 or less	15-19	20 or more
Amikacin (AK)	30	12 or less	13-15	16 or more
Streptomycin (S)	10	11 or less	12-14	15 or more
Cefotaxim (CF)	30	17 or less	18-22	23 or more
Neomycin (N)	30	12 or less	13-16	17 or more
Cephalothin (CN)	30	14 or less	15-17	18 or more
Erythromycin (E)	15	13 or less	14-22	23 or more
Chloramphenicol (C)	30	12 or less	13-17	18 or more
Sulphamethoxazol (SXT)	25	10 or less	11-15	16 or more

The tested strains were evaluated as susceptible, intermediate and resistant. Multiple Antibiotic Resistance (MAR) index for each strain was determined according to the formula stipulated by **Singh et al. (2010)** as follow: **MAR index=** No. of resistance (Isolates classified as intermediate were considered sensitive for MAR index) / Total No. of tested antibiotics.

2.3. In vitro Disinfectant efficacy against *Salmonella Typhimurium*:

2.3.1.Preparation of test strains **(Sutton et al., 2002)**

2.3.2. Preparation of Disinfectant Agent **(Linton et al., 1987)**

2.3.3. Disinfectant agents:

Alkadox®, Aldekol®, Virkon-S®, Iodoline®, Phenodex® and Swift® were prepared as per production procedure and/or supplier guideline so that the test solution is made to its final dilution using USP purified water with pH 5.0–7.0 from the facility distribution water system.

2.3.4. Antimicrobial Effectiveness Test

2.3.4.1.In vitro Surface Challenge Test **(Clontz, 2008)**

Supplementary table (2): sources and active ingredient of disinfectant:

Disinfectant	Source	Active ingredient
Virkon-S®	Antec International LTD UK	Potassium peroxymonosulfate and Sodium chloride
Aldekol®	EWABO Chemkalien, Gmbh	Glutaraldehyde, Quaternary ammonium compound, Formalin
Phenodex®	Chemi-care, A.R.E	Phenol, sodium sulphate salt, anionic surfactants
Alkadox®	Chemi-care, A.R.E	Sodium hypochlorite, Sodium carbonate
Swift®	Tristel, Cambridgeshire, CB8 7NY, UK	Chlorine dioxide
Iodoline®	Jordan Resource for Agricul. & Vet. Products	Iodine, phosphoric acid, sulphoric acid

2.4. Statistical analysis:

The obtained data were statistically analyzed using analysis of variance (ANOVA) test and comparative of means were performed according to Duncan Multiple Range test for comparison of Means according to **Snedecor, (1969)** using **SPSS14(2006)**.

3- Results and Discussion

Antibiotic resistance can be spread via residual antibiotics in food products, through the transfer of resistant foodborne pathogens, or through the ingestion of resistant strains among original food microflora and the transfer of resistance to pathogenic microorganisms **(Pesavento et al., 2007).**

In the current study the rate of resistant to the streptomycin was 100%, 96.2% for erythromycin, cefotaxim (80.8%), nalidixic acid (69.2%), sulphamethoxazol (65.4%), chloramphenicol (53.8%) and amikacin (50%). On contrary the sensitivity was 96.2% for gentamicin, (84.6%) ciprofloxacin, (73.1%) ampicillin and 76.9% for kanamycin (table 2). The findings to some extent comparable with **Esaki et al., (2004)** who found that Salmonella were isolated from food-producing animals samples and tested for antimicrobial susceptibility.

Table (3) Antimicrobial susceptibility of Salmonella species (n=26).

Antimicrobial agent	S		I		R	
	NO	%	NO	%	NO	%
Streptomycin (S)	-	-	-	-	26	100
Erythromycin (E)	-	-	1	3.8	25	96.2
Cefotaxim (CF)	1	3.8	4	15.4	21	80.8
Nalidixic acid (NA)	2	7.7	6	23.1	18	69.2
Sulphamethoxazol (SXT)	6	23.1	3	11.5	17	65.4
Chloramphenicol (C)	8	30.8	4	15.4	14	53.8
Amikacin (AK)	10	38.5	3	11.5	13	50.0
Cephalothin (CN)	11	42.3	5	19.2	10	38.5
Tetracycline (T)	15	57.8	1	3.8	10	38.5
Neomycin (N)	15	57.8	2	7.7	9	34.6
Kanamycin (K)	20	76.9	-	-	6	23.1
Ampicillin (AM)	19	73.1	3	11.5	4	15.4
Ciprofloxacin (CP)	22	84.6	2	7.7	2	7.7
Gentamicin (G)	25	96.2	-	-	1	3.8

S:Sensitive. I: Intermediate. R:Resistant

The isolates were resistant to ampicillin, dihydrostreptomycin, kanamycin, oxytetracycline, chloramphenicol, bicozamycin, nalidixic acid, oxolinic acid and trimethoprim during Japanese veterinary antimicrobial resistance monitoring program mean while **Molla and Zewdu (2004)** who reported that isolates of Sal¬monella from food items and personnel from Addis Ababa were resistant to commonly used antibiotics including streptomycin, ampicillin and tetracycline and susceptible to gentamicin more over **Tesfaw et al.,(2013)** found that 83.3, 50, 16.7, and 16.7% of Salmonella isolates were sensitive to tetracycline, ampicillin, amoxicillin, and chloramphenicol, respectively. However, all the isolates were susceptible to gentamycin, ceftriaxone, ciprofloxacin, and sulfamethoxazole. Nearly similar findings for Salmonella species isolated from abattoir in Adama town, Oromia, Ethiopia **Abunna et al., (2018)** who found that all isolates were 100%, 81.8% and 81.8% sensitive to gentamycin, kana¬mycin, sulphamethazole respectively. On the other hand the isolates were72.7%, 63.6%, and 54.5% resistant to streptomycin, cefoxitin and ampicillin respectively. The high level of resistance may be due to many bacteria come in close contact with many types of antibiotics miss used in animal medication, these processes contribute to resistance by overexposing cultures to these bactericidal or bacteriostatic chemicals (miss use of antibiotics in farm animals) **(Everage et al., 2014)**. This may lead to a development of antibiotic-resistant bacteria.

The data illustrated in table(3) showed that 71.4 % of S. Typhimurium isolates displayed five or more antimicrobial resistant profiles while 80 % of S. Enteritidis isolates displayed five or more antimicrobial resistant profiles, 75 % of S. Infantis isolates displayed five or more antimicrobial resistant profiles. Furthermore, multiple antibiotic resistance (MAR) index of isolated Salmonella species ranged from 0.143 to 1 with an average of 0.483. Salmonella Typhimurium and S. Infantis are serotypes frequently isolated from food of animal origin and food poisoning cases in Japan. With the antibiotic resistance genes integrated in the chromosome, most isolates show multi antibiotic resistant to five drugs **(Threlfall et al., 1994).** Moreover, 40.7% of S. Typhimurium isolates and was more often multi-drug resistant during Japanese veterinary antimicrobial resistance monitoring program **(Esaki et al., 2004)**.

Table (3): Antimicrobial resistance profile of Salmonella species

NO	Strains	Antimicrobial resistance profile	MAR index
1	*S. Typhimurium*	**S, E, CF, NA, SXT, C, AK, CN, T, N, K, AM, CP, G**	1
2	*S. Typhimurium*	**S, E, CF, NA, SXT, C, AK, CN, T, N, K, AM**	0.857
3	*S. Typhimurium*	**S, E, CF, NA, SXT, C, AK, CN, T**	0.643
4	*S. Typhimurium*	**S, E, CF, NA, SXT, C, AK**	0.500
5	*S. Typhimurium*	**S, E, CF, NA, SXT**	0.357
6	*S. Typhimurium*	**S, E, CF, NA**	0.286
7	*S. Typhimurium*	**S, E**	0.143
8	*S. Enteritidis*	**S, E, CF, NA, SXT, C, AK, CN, T, N, K, AM**	0.857
9	*S. Enteritidis*	**S, E, CF, NA, SXT, C, AK, CN, T, N**	0.714
10	*S. Enteritidis*	**S, E, CF, NA, SXT, C**	0.428
11	*S. Enteritidis*	**S, E, CF, NA, SXT**	0.357
12	*S. Enteritidis*	**S, E, CF**	0.214
13	*S. Infantis*	**S, E, CF, NA, SXT, C, AK, CN, T, N, K**	0.786
14	*S. Infantis*	**S, E, CF, NA, SXT, C, AK**	0.500
15	*S. Infantis*	**S, E, CF, NA, SXT**	0.357
16	*S. Infantis*	**S, E**	0.143
17	*S. Virchow*	**S, E, CF, NA, SXT, C, AK, CN, T, N, K**	0.786
18	*S. Virchow*	**S, E, CF, NA, SXT, C, AK, CN, T, N**	0.714
19	*S. Virchow*	**S, E**	0.143
20	*S. Montevideo*	**S, E, CF, NA, SXT, C, AK**	0.500
21	*S. Montevideo*	**S, E, CF**	0.214
22	*S. Montevideo*	**S**	0.071
23	*S. Heidelberg*	**S, E, CF, NA, SXT, C, AK, CN, T, N**	0.714
24	*S. Heidelberg*	**S, E, CF**	0.214
25	*S. Paratyphi A*	**S, E, CF, NA, SXT, C, AK, CN, T, N, K, AM, CP**	0.928
26	*S. Haifa*	**S, E**	0.143
Average 0.483			

S: Streptomycin E: Erythromycin CF: Cefotaxim NA: Nalidixic acid
SXT: Sulphamethoxazol AM: Ampicillin C: Chloramphenicol AK: Amikacin
CN: Cephalothin T: tetracycline N: Neomycin K: Kanamycin
CP: Ciprofloxacin G: Gentamicin

Furthermore the results were comparable to **Molla and Zewdu, (2004)** who reported that 25% anti¬microbial resistant Salmonella isolates **(Tesfaw et al., 2013)** found that 50% of Salmonella isolates were multiple antimicrobial resistant and **Abunna et al. (2018)** revealed that 54.5% were multiple antimi¬crobial resistant.

The variation in the MAR index could be attributed to differences in the sources of samples geographic distribution, which has differential selective pressures for the antibiotic resistance levels **(Lesley et al., 2011)**; and test methodologies **(Robert-Pillot et al., 2014)**.

The MAR index results higher than 0.2 could be due to contamination from high-risk sources, such as farm animals frequently exposed to antibiotics, resulting in potential risk to consumers. The high MAR in the current study indicated that the isolates originated from high-risk source samples; therefore, monitoring of antimicrobial resistance is essential to identify the effectiveness of new generations of antibiotics and to ensure the safety of meat.

One way to limit the occurrence and spread of *Salmonella* within the abattoir environment is through appropriate cleaning and disinfection programmes. Several approaches have been

investigated however, difficulties in eliminating *Salmonella* remain. Reasons for this include production of biofilms, or developed resistance to the cleaning agents and/or disinfectants, or harboring sites (i.e., cracks and holes in the lairage pens, drains) that are not easily cleaned or disinfected, all of which allow *Salmonella* to be survive **(Stewart et al., 2001).** The reduction percent of *S.Typhmurium* isolated from abattoir after exposure to some chemical disinfectant at 0.5 % concentration of Alkadox ,Aldekol, Virkon-S, Iodoline, Phenodex, Swift, respectively and contact time of 30, 60, 90 and 120 minutes was recorded in table (4), The table results revealed that the initial count of *S.Typhmurium* (zero time) was 4 x 10^6 /cm^2 surface after 30 mintes This count was reduced by 42.5, 37.5, 27.5, 25,15 and 12.5% respectively. Moreover, the reduction percent increased gradually after 60 minutes became 57.5, 47.5, 40, 35,27.5 and 22.5% , respectively.While the reduction percentages after contact time 90 minutes became 83, 67.5, 55, 50, 40 and 32.5% , respectively. Finally,after 120 minutes the reduction % was 97.6, 90.1, 79.5, 75.2, 67.5 and 55 %, respectively.

Table (4): Effect of different disinfectants (0.5%) against Salmonella Typhimurium (4.0×106/ cm2) at various contact times.

Disinfectant (0.5%)	Contact time								
	Zero time	30 min	R %	60 min	R %	90 min	R %	120 min	R %
Alkadox®	4.0×106	2.3×106	42.5	1.7×106	57.5	6.8×105	83.0	9.5×104	97.6
Aldekol®	4.0×106	2.5×106	37.5	2.1×106	47.5	1.3×106	67.5	3.7×105	90.1
Virkon-S®	4.0×106	2.9×106	27.5	2.4×106	40.0	1.8×106	55.0	8.2×105	79.5
Iodoline®	4.0×106	3.0×106	25.0	2.6×106	35.0	2.0×106	50.0	9.9×105	75.2
Phenodex®	4.0×106	3.4×106	15.0	2.9×106	27.5	2.4×106	40.0	1.3×106	67.5
Swift®	4.0×106	3.5×106	12.5	3.1×106	22.5	2.7×106	32.5	1.8×106	55.0

The reduction percent of *S.Typhmurium* isolated from abattoir after exposure to some chemical disinfectant at 1 % concentration of alkadox, aldekol, virkon-S, iodoline, phenodex and swift, respectively and contact time of 30, 60, 90 and 120 minutes was recorded in table (5), they also noticed that the initial count of *S.Typhmurium* (zero time) was 4 x 10^6 /cm^2 surface after 30 minutes . This count was reduced by 60, 52.5.5, 42.5, 37.5,30 and 25%, respectively. Moreover, the reduction percent increased gradually after 60 minutes became 80, 72.5, 65, 55,42.5 and 40% , respectively.

Table (5): Effect of different disinfectants (1%) against Salmonella Typhimurium (4.0×106/ cm2) at various contact times.

Disinfectant (1%)	Contact time								
	Zero time	30 min	R %	60 min	R %	90 min	R %	120 min	R %
Alkadox®	4.0×106	1.6×106	60.0	7.7×105	80.7	9.2×103	99.7	-	100
Aldekol®	4.0×106	1.9×106	52.5	1.1×106	72.5	8.3×104	97.9	5.1×103	99.8
Virkon-S®	4.0×106	2.3×106	42.5	1.4×106	65.0	2.9×105	92.8	2.4×104	99.4
Iodoline®	4.0×106	2.5×106	37.5	1.8×106	55.0	7.4×105	81.5	8.7×104	97.8
Phenodex®	4.0×106	2.8×106	30.0	2.3×106	42.5	1.1×106	72.5	3.9×105	90.2
Swift®	4.0×106	3.0×106	25.0	2.4×106	40.0	1.6×106	60.0	7.2×105	82.0

The reduction percentages after contact time 90 minutes became 99.7, 97.9, 92.8, 81.5, 72.5 and 60% , respectively. Finally,after 120 minutes the reduction % were 100, 99.8, 99.4, 97.8, 90.2 and 82 %, respectively.The reduction percent of *S.Typhmurium* isolated from abattoir after exposure to some chemical disinfectant at 1.5 % concentration of alkadox, aldekol, virkon-S, iodoline, phenodex and swift, respectively and contact time of 30, 60, 90 and 120 minutes was recorded in table (6). also noticed that the initial count of *S.Typhmurium* (zero time) was 4 x 10^6 /cm^2 surface after 30 minutes . This count was reduced by 75, 70, 55, 50,42.5 and 37.5 %, respectively. Moreover, the reduction percent increased gradually after 60 minutes became 99.1, 98, 72.5, 70, 60 and 52.5% , respectively. The reduction percentages after contact time 90 minutes became 100, 99.8, 97.9, 94.5, 85 and 70% , respectively. Finally,after 120 minutes the reduction % were 100, 100, 99.7, 99.6, 97.8 and 91 %, respectively**.**

Table (6): Effect of different disinfectants (1.5%) against Salmonella Typhimurium (4.0×106/ cm2) at various contact times.

Disinfectant (1.5%)	**Contact time**								
	Zero time	**30 min**	**R %**	**60 min**	**R %**	**90 min**	**R %**	**120 min**	**R %**
Alkadox®	4.0×106	1.0×106	75.0	3.5×104	99.1	-	100	-	100
Aldekol®	4.0×106	1.2×106	70.0	7.9×104	98.0	4.6×103	99.8	-	100
Virkon-S®	4.0×106	1.8×106	55.0	1.1×106	72.5	8.1×104	97.9	9.8×103	99.7
Iodoline®	4.0×106	2.0×106	50.0	1.2×106	70.0	2.2×105	94.5	1.5×104	99.6
Phenodex®	4.0×106	2.3×106	42.5	1.6×106	60.0	6.0×105	85.0	8.7×104	97.8
Swift®	4.0×106	2.5×106	37.5	1.9×106	52.5	1.2×106	70.0	3.6×105	91.0

The reduction percent of S.Typhmurium isolated from abattoir after exposure to some chemical disinfectant at 2 % concentration of alkadox, aldekol, virkon-S, iodoline, phenodex and swift, respectively and contact time of 30, 60, 90 and 120 minutes was recorded in table (7).

Table (7): Effect of different disinfectants (2%) against Salmonella Typhimurium (4.0×106/ cm2) at various contact times.

Disinfectant (2%)	**Contact time**								
	Zero time	30 min	R %	60 min	R %	90 min	R %	120 min	R %
Alkadox®	4.0×106	5.3×104	98.6	-	100	-	100	-	100
Aldekol®	4.0×106	1.1×105	97.2	9.0×103	99.8	-	100	-	100
Virkon-S®	4.0×106	4.7×105	88.3	2.6×104	99.3	3.4×103	99.9	-	100
Iodoline®	4.0×106	8.0×105	80.0	5.5×104	98.6	9.1×103	99.7	-	100
Phenodex®	4.0×106	1.0×106	75.0	3.9×105	90.2	7.5×104	98.1	9.0×102	99.9
Swift®	4.0×106	1.5×106	72.5	8.3×105	79.3	1.0×105	97.5	4.8×104	98.8

It is noticed that the initial count of S.Typhmurium (zero time) was 4 x 106 /cm2 surface after 30 minutes in. This count was reduced by 98.6, 97.2, 88.3, 80,75 and 72.5 %, respectively. Moreover, the reduction percent increased gradually after 60 minutes became 100, 99.8, 99.3, 98.6, 90.2 and 79.3% , respectively. The reduction percentages after contact

time 90 minutes became 100, 100, 99.9, 99.7, 98.1 and 97.5% , respectively. Finally,after 120 minutes the reduction % were 100, 100, 100, 100, 99.9 and 98.8 %, respectively.

It is clear from tables (4, 5 ,6 and7) that the reduction percent of the used disinfectants increased by the time to reach 100% or nearly approach as in case of most disinfectants used. The first disinfectant was alkadox followed by aldekol while considered as the most superior disinfectant while , swift was the least one.Regarding to the effect of quaternary ammonium compound active ingredient in aldekol nearly similar effects which lead to declines in the probability of detecting Salmonella 17/72 of swabs positive for Salmonella. A greater reduction in the number of Salmonella positive swabs 1/72 was detected following the combined use of quaternary ammonium compound and the chlorocresol based disinfectant, resulting in a reduction in the probability of detecting Salmonella **(Walia et al., 2017)**. Moreover, Salmonella Typhimurium strain was selected and decontaminated with glutaraldehyde , QAC and formaldehyde-based products (Aldekol) on abattoir surfaces and showed great reduction **(Gosling et al.2017)**.Several studies have revealed the efficacy of chlorine dioxide (swift) as a sanitizer for reducing *Salmonella* from fruit surfaces and food processing plants **(Du et al., 2003**). A recent study in Republic of Korea by **Ahmed et al. (2017)** found that *Salmonella* was reduced in all measuring period; with the highest disinfection rate occurring at 6 hours under the effect of chlorine dioxide the active ingridient of swift.Nearly similar reduction % was obtained by examined Sodium hypochlorite 5%, 8% and 10% achieved 78%, 94% and 100% killing efficacy after 4 h contact, respectively.Morover, Carbolic acid 6.5% achieved a highly significant 100% killing efficacy after 4 hours exposure **(Soliman, et al., 2016)**.

4-Conclusion

Higher rate of resistance in Salmonella to the common used antibiotics such as streptomycin,erythromycin, sulphamethoxazol. Meanwhile, sensitivity was detected for gentamicin, ciprofloxacin, ampicillin and for kanamycin.

The most effective disinfectant for reducing the viability of Salmonella Typhimurium is the disinfectant which contains quaternary ammonium compound, potassium peroxymonosulphate, sodium chloride and Glutraladyde in its components.

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الملخص العربى

دراسات مقارنة عن مدى تواجد سالمونيلا التسمم الغذائى فى ذبائح الحيوانات

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أختبار حساسية السالمونيلا للمضادات الحيوية المختلفة : وجد أن عزلات السالمونيلا لها القدرة على مقاومة الأستريبتومايسين بنسبة 100% والأيريثرومايسين بنسبة 96.2% والسيفوتاكسيم 80.8 % و النالديكسيك أسيد 69.2 % والسلفاميسكزول بنسبة 65.4 % والكلورامفينكول 53.8% و الأماسيكين 50% بينما كانت عزلات السالمونيلا حساسة للجنتاميسين بنسبة 96.2% والسيبرو فلوكساسين بنسبة 73.1 والأمبيسلين بنسبة 76.9% وقد عزيت هذه المقاومة أن البكتريا قد سبق أن تعرضت لهذه المضادات الحيوية أثناء علاج الحيوانات خلال فترة التربية أو أستخدام المضادات الحيوية كمحفزات للنمو.

بحساب معامل مقاومة المضادات الحيوية وجد أن 71.4 % من عزلات السالمونيلا تيفيميوريم لها القدرة على مقاومة سبع مضادت حيوية أو أكثر و 80% من السالمونيلا أنترتيدس لها القدرة على مقاومة خمس مضادات حيوية أو أكثر و 75% من السالمونيلا أنفانتس لها القدرة على مقاومة خمس مضادات حيوية أو أكثر.

بلغ متوسط معامل مقاومة المضادات الحيوية 0.483 وكان ينحصر بين 0.143 و 1 ويعتبر المؤشر دليلا على مقاومة المضادات الحيوية عندما يزيد عن 0.2 أو يكون للميكروب القدرة على مقاومة ثلاثة أنواع من المضادات الحيوية من مجموعات مختلفة.

تأثير بعض المطهرات على السالمونيلا تيفيميوريم: أوضحت النتائج المعملية أن معدل الخفض فى ميكروبات السالمونيلا يزداد تدريجيا حتى يصل إلى 100% مع زيادة الوقت وزيادة التركيز فى المطهرات المستخدمة وكانت أفضل النتائج باستخدام الألكودكس متبوعا بالأديكول بينما كان السويفت أقل النتائج.

خلصت الدراسة الى أن درجة تلوث الذبائح وأعضائها بميكروب السالمونيلا فى مجازر الشرقية عالية كما أن ميكروبات السالمونيلا التى تم عزلها عالية الضرواة ولها القدرة على مقاومة العديد من المضادات الحيوية.