

Contamination of Chicken Meat With *Salmonella* spp Distributed in Mahabad City, Iran

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Abstract

**Background:** Foodborne diseases are one of the fundamental problems in the world. *Salmonella* is one of the most important foodborne bacteria, which is responsible for the prevalence of foodborne diseases in humans.

**Objective:** The aim of this study was to investigate the presence of *Salmonella* in distributed chicken meat in Mahabad city, Iran.

**Materials and Methods:** In this study, 100 samples of chicken meat were selected from Mahabad city and investigated for the presence of *Salmonella*. Each sample was cultured in selenite cystine medium and incubated at 37°C for 24 hours. Then the obtained colonies were cultured in MacConkey agar and Salmonella-Shigella agar. Finally, biochemical and antibiogram tests were performed on isolated *Salmonella* samples.

**Results:** Totally, 7 chicken samples (7%) were found to be contaminated with *Salmonella*. All of the isolated *Salmonella* samples were identified as *Salmonella enteritidis*. All of *S. enteritidis* isolates (100%) showed the highest resistance to erythromycin and ampicillin antibiotics. All of the tested isolates (100%) showed sensitivity to gentamicin.

**Conclusion:** Our study showed high prevalence of *Salmonella* in distributed chicken meat in Mahabad city. Therefore, the improvement of health conditions in food preparation centers is highly recommended.

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human. Therefore, we aimed to evaluate the presence of \textit{Salmonella} in distributed chicken meat in Mahabad city, Iran.

\textbf{Materials and Methods}

\textbf{Sample Collection and Preparation}

For this study, we collected 100 samples of chicken meat (thigh and breast, 100 g) from a slaughterhouse in Mahabad city. The collected samples were transported on ice to the Microbiology Laboratory of Maragheh Islamic Azad University, Iran.

\textbf{Isolation and Identification of Salmonella}

Twenty-five grams of tissue samples was added to 225 mL of lactose broth medium and incubated at 37°C for 24 hours (Brilliant green stain was added as growth inhibitor of gram-positive bacteria). Then, 1 mL of this medium was added to 9 mL of selenit cysteine and incubated at 37°C for 24 hours. One loop of current medium was transferred to MacConkey agar, Salmonella Shigella (SS) agar, and Xylose Lysine Deoxycholate (XLD) agar, separately. Colorless colonies (lactose negative) were considered as suspicious of \textit{Salmonella}. These colonies were cultured in Triple Sugar Iron (TSI) agar, Lysine Iron Agar (LIA), Sulphide Indole Motility (SIM) agar and Urea agar. Furthermore, the reaction of these colonies was assessed in arabinose, raffinose, trehalose, arginine, malonate, ornithine, and salicin media. Finally, \textit{Salmonella} species were identified serologically using polyvalent antiserum (Bahar Afshan Company, Iran).\textsuperscript{12}

\textbf{Antimicrobial Resistance and Antibiogram}

The sensitivity of isolated \textit{Salmonella} samples to antibiotic was evaluated using disk diffusion method on Mueller-Hinton agar medium (Bahar Afshan Company, Iran) according to the criteria published by the Clinical and Laboratory Standards Institute (CLSI). The used antibiotics were: cephalexin, gentamicin, kanamycin, neomycin, tetracycline, ampicillin, nalidixic acid, cotrimoxazole, and erythromycin.\textsuperscript{13}

\textbf{Results}

In our study, 7 chicken samples (7\%) were contaminated with \textit{Salmonella}. The serotyping results also showed that \textit{S. enteritidis} was the sole serovar of \textit{Salmonella} in distributed chicken raw meat in Mahabad city. All of \textit{S. enteritidis} isolates (100\%) showed the most antibiotic sensitivity to erythromycin and ampicillin. All of the tested isolates (100\%) also showed resistance to gentamicin (Table 1).

\textbf{Discussion}

The results of this study showed that 7\% of chicken samples were contaminated with \textit{Salmonella} and serotyping results showed that \textit{S. enteritidis} was the sole serovar. Unlike our study, some studies reported high prevalence of \textit{Salmonella} in chicken meat samples in Iran and other countries.\textsuperscript{14-16} In a study, Dhaher et al showed that 24.76\% of chicken samples were contaminated with \textit{Salmonella} in Iraq.\textsuperscript{17} Alali et al showed that 31.5\% of retail chicken meat samples were contaminated with \textit{Salmonella} in Russia.\textsuperscript{18} In another study, Todd reported that the prevalence of \textit{Salmonella} in chicken meat was 13.3\% in Ethiopia.\textsuperscript{19} High prevalence of \textit{Salmonella} were reported by Tibajjuka, as 42\% of chicken samples were contaminated with \textit{Salmonella}.\textsuperscript{20} The presence of \textit{Salmonella} might be indicative of poor hygiene and a potential danger to consumers.

In the present study, the most frequently isolated serotype was \textit{S. enteritidis}. Like this study, in several studies the most frequently isolated serotype was \textit{S. enteritidis}.\textsuperscript{21} For example, Jalili et al reported that \textit{S. enteritidis} was the most frequently isolated serotype (29\%) from chicken meat samples in Iran.\textsuperscript{21} On the contrary, Molla and Mesfin showed that \textit{S. braenderup} and \textit{S. typhimurium} were the dominant serotypes in Ethiopia.\textsuperscript{22} Moreover, Abdellah et al reported that \textit{S. typhimurium} (40.35\%) was the dominant serotype between 4 different serotypes isolated from chicken meat and giblets.\textsuperscript{23}

In this study, all of \textit{S. enteritidis} isolates showed the highest antibiotic sensitivity to erythromycin and ampicillin. On the other hand, all of the tested isolates showed resistance to gentamicin. Likewise, resistance to mentioned antibiotics was reported in some other studies on chicken meat worldwide.\textsuperscript{24,25} Our study showed that some \textit{Salmonella} isolates were resistant to tetracycline.

\begin{table}[h]
\centering
\caption{The Resistance and Sensitivity of Isolated \textit{Salmonella} to Different Antibiotics}
\begin{tabular}{|c|c|c|c|c|}
\hline
\textbf{Antibiotics} & \textbf{Dose (µg)} & \textbf{Sensitive (\%)} & \textbf{Resistant (\%)} & \textbf{Semi-sensitive (\%)} \\
\hline
Cotrimoxazole & 30 & 4 (57.1) & 3 (42.9) & 0 (0\%) \\
Cephalexin & 30 & 8 (85.7) & 1 (14.3) & 0 (0\%) \\
Neomycin & 10 & 8 (85.7) & 1 (14.3) & 0 (0\%) \\
Tetracycline & 30 & 3 (42.9) & 4 (57.1) & 0 (0\%) \\
Erythromycin & 10 & 7 (100\%) & 0 (0\%) & 0 (0\%) \\
Kanamycin & 30 & 8 (85.7) & 1 (14.3) & 0 (0\%) \\
Ampicillin & 10 & 7 (100\%) & 0 (0\%) & 0 (0\%) \\
Gentamicin & 30 & 0 (0\%) & 7 (100\%) & 0 (0\%) \\
Nalidixic acid & 30 & 4 (57.1) & 3 (42.9) & 0 (0\%) \\
\hline
\end{tabular}
\end{table}
Our results did not corroborate the results of Dallal et al. in Iran where the prevalence of resistance was found to be higher than in our study. In addition, we did not find any multi-drug resistant Salmonella serovars from different broiler chickens associated with those of human isolates. Further studies are needed to investigate the prevalence and multidrug resistance of Salmonella serovars in Iran.

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