

Salmonella Enteritidis in chicken carcasses and giblets in Southern Chile

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Abstract

Background: Gastroenteritis caused by *Salmonella* spp. is mainly related to the consumption of undercooked chicken meat or raw poultry products. The objective of this study was to assess the occurrence of *Salmonella* spp. in chicken carcasses and giblets commercialized in Southern Chile (Valdivia city).

Methodology: A total of 560 samples were collected from four supermarkets and one poultry products dealer, during two periods (autumn-winter and spring-summer periods), and analysed for *Salmonella* using standard bacteriological procedures.

Results: Five out of 280 analyzed carcasses (1.8%) and one out of 280 (0.4%) chicken giblets were *Salmonella* positive. The isolation frequency of *Salmonella* spp. considering the total samples analyzed was 1.1%. *Salmonella* Enteritidis was the only serotype isolated. No significant differences ($P > 0.05$) in the isolation rates between the autumn-winter and spring-summer periods were found.

Conclusion: *Salmonella* Enteritidis was isolated in low frequency from chicken carcasses and giblets commercialized in Southern Chile (Valdivia city); however, in spite of the low frequency of contaminated samples, this kind of food could be a potential vehicle of *Salmonella* infection to humans.

Key words: *Salmonella*, giblets, carcasses, chicken

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Introduction

Gastroenteritis caused by *Salmonella* is related to the consumption of raw food, foods that were not cooked thoroughly, or cross-contaminated food. The main foods associated with Salmonellosis are eggs and chicken meat [1-2]. Salmonellosis is highly prevalent in developed and developing countries, and, together with campylobacteriosis, is a widely spread zoonosis that has a significant economic impact at the public health and poultry industry levels [3-4]. Therefore, the poultry industry has focused special attention on implementing control measures to reduce the dissemination of the pathogen in the production processes, from breeding farms to commercialization sites [5].

In Chile, there are periodical reports of food poisoning in which poultry products, among others, have been identified as the infection vehicle. For this reason, it is necessary to evaluate the sanitary quality of this type of product [6]. Alexandre *et al.* (1999) reported the presence of *Salmonella* Enteritidis in poultry products for human consumption in Santiago,

Chile, thus demonstrating that there is a potential risk for the population consuming this type of food [7].

The objective of this study was to evaluate the *Salmonella* contamination of refrigerated chicken meat and giblets available for human consumption in the city of Valdivia, in two periods of the year.

Materials and methods

Type of samples

The analysed samples were obtained from one distributor and four supermarkets from Valdivia, Chile, and corresponded to two producers who were assigned codes A and B. A total of 560 samples were collected: from producer A, 140 refrigerated carcasses and 140 refrigerated giblets (liver, gizzard and heart), and the same amount and type of samples were collected from producer B. Sampling was conducted in two periods, autumn-winter and spring-summer.

Table 1. Isolation frequency of *Salmonella* Enteritidis in chicken carcasses and giblets.

Sample	Number	Positive	%
Carcasses	280	5	1.8
Giblets	280	1	0.4
Total	560	6	1.1

Isolation method

The traditional technique recommended by Corlett [8] was used for the bacteriological analysis of the samples (enriched broth, selective media, biochemical tests and serology). In brief, the chicken carcasses and giblets were washed in sterile polyethylene bags, with 300 and 150 ml of 1% peptone broth, respectively, followed by a shaking period of three minutes. Then 30 ml of the washing broth were collected for each sample and added to 30 ml of 1% peptone broth and incubated at 37°C for 24 hours. Following incubation, two aliquots were drawn from each container; one milliliter was added to 10 ml of selenite cystein broth (SCB) (Merck) and incubated at 37°C for 20 hours, and 0.1 ml was added to 9.9 ml of Rappaport Vassidialis Novobiocin broth (Merck). Both samples were incubated at 42°C for 24 hours. After incubation, aliquots of the enrichment broths were seeded on two selective media, Xylose-Lysine-Desoxycholate Agar (XLD) (Merck) and Rambach Chromogen Agar (Merck), and incubated at 37°C for 24 hours. Suspicious colonies were identified by means of biochemical tests to the genus level. The *Salmonella* strains were serotyped at the Enterobacteria Reference Center of the Institute of Public Health of Chile.

Statistical Analysis

Descriptive statistics were used to analyze the obtained data. Isolation rates from both periods (fall-winter and spring-summer) were compared by χ^2 test, using the Epi Info program, version 6.04.

Results

Salmonella was isolated from 6 out of 560 samples (1.1%) of carcasses and chicken giblets commercialized in Valdivia, Chile, with five isolations coming from carcasses and one from giblets (Table 1). From producer A, five samples positive for *Salmonella* were obtained (one from giblets and four from carcasses), and from producer B one positive sample was obtained (one from carcass). All six isolates corresponded to *Salmonella* Enteritidis.

No statistically significant differences in the frequency of *Salmonella* Enteritidis isolation during autumn-winter and spring-summer periods were observed.

Discussion

There are a vast number of reports in the literature about the isolation of *Salmonella* in poultry products. According to Prado *et al.*, *Salmonella* spp. and *Staphylococcus aureus* are the main bacterial agents in Chile isolated in outbreaks related to food-transmitted diseases, with eggs and poultry meat being the transmission vehicle for *Salmonella* [6]. The percentage of isolation obtained in this study (1.1%), is lower than that reported by other researchers with similar samplings. In Zambia, Mudenda *et al.* analyzed 521 chicken carcasses obtained from a slaughterhouse, reporting an isolation frequency of 20.5% [9]. In Ethiopia, Molla *et al.* (2003), analyzed 452 carcasses and 312 samples of chicken parts, obtained from different supermarkets. The isolation frequency was 8.3% and 31.7% respectively [1]. In Brazil, Silva *et al.* analyzed 150 frozen chicken carcasses obtained at different points of sale, reporting a *Salmonella* isolation frequency of 32.0 % [10]. In the Chilean Metropolitan Area, Alexandre *et al.* reported an isolation frequency of 8.3% and 12.9% in chicken meat and parts, respectively, with the most prevalent serotype being *Salmonella* Enteritidis [7].

The difference between the results obtained in this study and those reported by previous studies could be a consequence of several factors. Some researchers discussed the detrimental effect of the refrigeration temperatures on the microorganisms, which make their recovery more difficult [11]. Therefore, the results obtained depend on when the sample was collected during the production process since greater isolation frequency was obtained from samples collected at the slaughterhouse, rather than the those collected at a supermarket or other commercial premises where the products are kept suitably cooled [9]. Another factor to consider is the technique employed. The traditional technique (selective enrichment broth, media, biochemical tests

and serology) has a good sensitivity; nevertheless, simultaneous use of two techniques significantly increases the number of isolates. Reginato *et al.* compared the traditional technique (used in this study) with the immunomagnetic separation technique to detect *Salmonella* in poultry-related products and concluded that the sensitivity increases when both techniques are used simultaneously [12].

Although the number of isolations was relatively higher in the second period (spring-summer), the difference with the first period (autumn-winter) was not significant. This could be explained because in both periods the cooling chain had been managed properly. The isolation frequency of *Salmonella* obtained in poultry products in Valdivia would probably increase if two isolation techniques were used simultaneously in order to increase sensitivity, as reported by Alexander *et al.* [7].

Although our results indicate a low isolation frequency, *Salmonella* Enteritidis is a serotype that could be found in chicken carcasses and giblets, which could be a vehicle of *Salmonella* infection to humans. In order to prevent food poisoning problems caused by *Salmonella*, it is necessary to reinforce education programs directed to the population related to the correct handling and cooking of these products.

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