

# **A survey on *Salmonella* infection in broiler farms around Mashhad city: determination of serogroups and antimicrobial resistance pattern of the *Salmonella* isolates**

Peighambari, S.M.<sup>1</sup>; Qorbaniun, E.<sup>2</sup>; Morshed, R.<sup>3</sup> and Haghbin Nazarpak, H.<sup>4</sup>

Received: 22.02.2017

Accepted: 28.10.2017

## **Abstract**

Zoonotic diseases of food origin such as salmonellosis are among the main economic and health issues in industrialized and non-industrialized countries. Poultry can play an important role in epidemiology and distribution of salmonellosis in humans. The aims of this study were to isolate *Salmonella* from poultry farms around Mashhad city, identify the serogroups and determine the antimicrobial resistance patterns of the isolated *Salmonella*. A total number of 1560 samples were collected from freshly dropped feces of broiler chickens in 23 flocks. Every 10 samples were pooled and processed for *Salmonella* isolation according to standard procedures. Slide agglutination test was used for determination of O serogroups using polyvalent antisera of A to D. Antimicrobial susceptibility of the isolates against 27 agents was determined using standard disk diffusion method. Out of 1560 samples (156 pooled-samples), 30 *Salmonella* isolates were recovered. The results of serological tests identified six serogroup D, one serogroup other than A-D and the rest of 23 isolates as serogroup C. The highest resistance was belonged to colistin, amoxiclav, oxytetracycline, nitrofurantoin, doxycycline, nalidixic acid and the highest susceptibility belonged to fosfomycin, ceftriaxone, cefixime, norfloxacin and gentamycin. Multi-drug resistance was common among the *Salmonella* isolates. Resistance to at least 2 and at most 18 antimicrobial agents was shown. Nineteen drug resistance patterns were found. The results of this study showed the presence of *Salmonella* infection among broiler chickens in Mashhad region and the occurrence of antimicrobial resistance among the isolates.

**Key words:** *Salmonella*, Antimicrobial resistance, Broilers, Mashhad

---

1- Professor, Department of Avian Diseases, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran

2- DVM Graduated, Faculty of Veterinary Medicine, Islamic Azad University- Garmsar branch, Garmsar, Iran

3- Assistant Professor, Veterinary and Agriculture Group, Iran Encyclopedia Compiling Foundation, Ministry of Science Research and Technology, Tehran, Iran

4- Assistant Professor, Department of Clinical Science, Faculty of Veterinary Medicine, Islamic Azad University, Garmsar branch, Garmsar, Iran

**Corresponding Author:** Peighambari, S.M., E-mail: mpeigham@ut.ac.ir

## References

- Asadpour, Y.; Mohammadi, M.; Pourbakhsh, S.A. and Rasa, M. (2014). Isolation, serotyping and antibiotic resistance of *Salmonella* isolated from chicken carcasses in Guilan province. *Iran Veterinary Journal*, 9: 5-13.
- Centers for Diseases Control and Prevention. Foodborne diseases active surveillance network (foodnet) (2012). Foodnet surveillance report for 2011 (final report). Atlanta, Georgia: U.S. Department of Health and Human Services, CDC. Available at://www.cdc.gov/foodnet/PDFs/2011\_annual\_report\_508c.pdf. Accessed 22 April 2014.
- Clinical and Laboratory Standard Institute (CLSI) (2006). Performance Standards for Antimicrobial Disk Susceptibility Testing. 16th informational supplement. Wayne, PA: CLSI.
- Corry, J.E.L.; Allen, V.M.; Hudson, W.R.; Breslin, M.F. and Davies, R.H. (2002). Sources of *Salmonella* on broiler carcasses during transportation and processing: modes of contamination and methods of control. *Journal of Applied Microbiology*, 92: 424-432.
- Crump, J.A.; Medalla, F.M.; Joyce, K.W.; Krueger, A.L.; Hoekstra, R.M.; Whichard, J.M. et al. (2011). Antimicrobial resistance among invasive nontyphoidal *Salmonella enterica* isolates in the United States: National Antimicrobial Resistance Monitoring System, 1996 to 2007. *Antimicrobial Agents and Chemotherapy*, 55: 1148-1154.
- Doulatyabi, S.; Peighambari, S.M. and Morshed, R. (2017). Survey of *Salmonella* infections in broiler farms around Sanandaj. *Journal of Ilam University of Medical Sciences*. 25: 70-78.
- Duchet-Suchaux, M.; Lechopier, P.; Marly, J.; Bernardet, P.; Delaunay, R. and Pardon, P. (1995). Quantification of experimental *Salmonella enteritidis* carrier state in B13 leghorn chicks. *Avian Diseases*, 39: 796-803.
- Eram, N.; Peighambari, S.M. and Yazdani, A. (2013). Study on *Salmonella* infection in broiler farms around Ghaemshahr: Determination of serotypes and drug resistance pattern of the *Salmonella* isolates. *Journal of Veterinary Laboratory Research*. 5: 85-93.
- European Food Safety Authority (2010). The community summary report on trends and sources of zoonoses, zoonotic agents and food-borne outbreaks in the European Union in 2008. *European Food Safety Authority Journal*, 8: 1496.
- Ezzatpanah, E.; Moradi Bidhendi, S.; Khaki, P.; Ghaderi, R.; Seyedan Jasbi, E. and Moghtadaei far, S. (2013). Isolation, serotyping and antibiotic resistance of *Salmonella* isolated from poultry in Arak city. *Iran Veterinary Journal*, 9: 88-96.
- Gast, R.K. *Salmonella* infection. In: Saif, Y.M.; Fadly, A.M.; Glisson, J.R.; McDougald, L.R.; Nolan, L.K and Swayne, D.E. (eds). (2008). *Diseases of Poultry*. 12<sup>th</sup> ed. Iowa, Blackwell Publishing, Pp: 636-651.
- Gieraltowski, L.; Higa, J.; Peralta, V.; Green, A.; Schwensohn, C.; Rosen, H. et al. (2016). National outbreak of multidrug resistant *Salmonella* Heidelberg infections linked to a single poultry company. *PLoS One*. 11: e0162369.
- Hendriksen, R.S.; Vieira, A.R.; Karlsmose, S.; Lo Fo Wong, D.M.; Jensen, A.B.; Wegener, H.C. et al. (2011). Global monitoring of *Salmonella* serovar distribution from the World Health Organization global foodborne infections network country data bank: results of quality assured laboratories from 2001 to 2007. *Foodborne Pathogens and Diseases*, 8: 887-900.
- Hennessy, T.W.; Cheng, L.H.; Kassenborg, H.; Ahuja, S.D.; Mohle-Boetani, J.; Marcus, R. et al. (2004). Egg consumption is the principal risk factor for sporadic *Salmonella* serotype Heidelberg infections: a case-control study in FoodNet sites. *Clinical Infectious Diseases*, 38: 237-243.
- Jamshidi, A.; Zahraie Salehi, M.T. and Afsharinic, S. (2007). Detection of *Salmonella* spp. contamination of carcasses slaughtered in poultry abattoir in Mashhad, Iran. *Archives of Razi Institute*, 62: 229-233.
- Kottwitz, L.B.M.; Back, A.; Leão, J.A.; Alcocer, I.; Karan, M. and Oliveira, T.M. (2008). *Salmonella* contamination in an egg production chain of a laying hens integration. *Brazilian Journal of Veterinary and Animal Science*, 60 (2): 496-498. [Abstract in English].
- Mead, P.S.; Slutsker, L.; Dietz, V.; McCaig, L.F.; Bresee, J.S.; Shapiro, C. et al. (1999). Food-related illness and death in the United States. *Emerging Infectious Diseases*, 5: 607-625.

- M'ikanatha, N.M.; Sandt, C.H.; Localio, A.R.; Tewari, D.; Rankin, S.C.; Whichard, J.M. et al. (2010). Multidrug-resistant *Salmonella* isolates from retail chicken meat compared with human clinical isolates. *Foodborne Pathogens and Disease*. 7: 929-934.
- Morshed, R. (2013). Bacteriological study of broiler flocks (*Salmonella* contamination) in Amol city. *Veterinary Journal (Pajouhesh & Sazandegi)*, 97: 23-28.
- Morshed, R. and Peighambari, S.M. (2010). *Salmonella* infections in poultry flocks in the vicinity of Tehran. *International Journal of Veterinary Research*, 4: 273-276.
- Olsen, J.E.; Brown, D.J.; Madsen, M. and Bisgaard, M. (2003). Cross contamination on a broiler slaughterhouse line demonstrated by use of epidemiological markers. *Journal of Applied Microbiology*, 94: 826-835.
- Peighambari, S.M.; Morshed, R.; Baziar, M.; Sharifi, A. and Sadrzadeh, A. (2018). Salmonellosis in broiler flocks of Golestan province: frequency, serogroups and antimicrobial resistance patterns of *Salmonella* isolates. *New Findings in Veterinary Microbiology*. 2: 72.
- Peighambari, S.M.; Morshed, R.; Shojadoost, B.; Nikpiran, H.; Haghbin Nazarpak, H.; Khakpour, M. et al. (2019). Survey of non-typhoid *Salmonella* infections among some broiler flocks of Mazandaran and Gilan provinces, 2010-2015. *Iranian Journal of Veterinary Clinical Sciences*. *In press*.
- Peighambari, S.M.; Sorahi Nobar, M. and Morshed, R. (2015). Detection of *Salmonella enterica* serovar Infantis among serogroup C *Salmonella* isolates from poultry using PCR and determination of drug resistance patterns. *Iranian Veterinary Journal*, 11:54-60.
- Rahmani, M.; Peighambari, S.M.; Svendsen, C.A.; Cavaco, L.M.; Agersø, Y. and Hendriksen, R.S. (2013) Molecular clonality and antimicrobial resistance in *Salmonella enterica* serovars Enteritidis and Infantis from broilers in three Northern regions of Iran. *BMC Veterinary Research*, 9: 66.
- Trongjit, S.; Angkititrakul, S.; Tuttle, R.E.; Pongseeree, J.; Padungtod, P. and Chuanchuen, R. (2017) Prevalence and antimicrobial resistance in *Salmonella enterica* isolated from broiler chickens, pigs and meat products in Thailand-Cambodia border provinces. *Microbiology and Immunology*. 61: 23-33.
- Waltman, W.D.; Gast, R.K. and Mallinson, E.T. Salmonellosis. In: Swayne, D.E.; Glisson, J.R.; Jackwood, M.M.; Pearson, J.E. and Read, W.M. (eds). (1998). *A Laboratory Manual for the Isolation and Identification of Avian Pathogens*. 4<sup>th</sup> ed. Pennsylvania, American Association of Avian Pathologists, pp: 4-13.
- WHO (2001). (WHO Global Strategy for Containment of Antimicrobial Resistance) WHO, Geneva. WHO/CDC/CSR/DRS/2001.2.
- Wilks, C.; Parkinson, G. and Young, P. (2000). International review of (SE) epidemiology and control policies. Rural Industries Research and Development Corporation, Project: DAV-146A. Publication No: 00-145. Kingston, Australia.