J Med Bacteriol. *Vol. 5, No. 3, 4 (2016): pp.50-53* *jmb.tums.ac.ir*

Detection of *Salmonella* Carriers in Sheep and Goat Flocks of Bushehr and Lorestan Provinces, Iran

Hossein Esmaeili [1*], *Hamideh Kalateh Rahmani* [2]

[1] *Department of Microbiology, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran.*

[2] *Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran.*

ARTICLE INFO

Article type:
Short Communication

Article history:
Received: 30 Apr 2016
Revised: 12 Aug 2016
Accepted: 29 Sep 2016
Published: 15 Oct 2016

Keywords:
Bushehr, Iran, Lorestan, Salmonella, Small ruminant.

ABSTRACT

***Background*:** Salmonellosis is an infectious and a food-borne disease of humans and animals. The initial source of the infection is the intestinal tracts of birds and other animals. Apparently healthy animals can become subclinical carriers and persistently shed *Salmonella* in their feces which can act as a reservoir for the pathogen. The aim of this study is to detect the carriers of *Salmonella* among apparently healthy sheep and goat flocks of Bushehr and Lorestan provinces, Iran.

***Methods*:** A total of 389 fecal samples were aseptically collected from the rectum of apparently healthy sheep and goat flocks of Bushehr and Lorestan provinces. Bacteriological culture was conducted using selenite cystine, Rappaport–Vassiliadis, brilliant green and xylose lysine deoxycholate agar. Suspected colonies were inoculated in to TSI, peptone water, Simmon's Citrate, Urea medium and MRVP. Sero-groups were detected by antisera.

***Results*:** Two samples from 189 samples (1.05%) were positive for *Salmonella* in Bushehr province. *Salmonella abortusovis* and *Salmonella typhimurium* were detected following serotyping. No *Salmonella* carriers were detected in Lorestan province.

***Conclusion*:** As the rate of carriers of *Salmonella* was low, the risk of food-borne salmonellosis due to consumption of small ruminant's meat is low, especially in the condition of well cooked meat. Since *S. abortusovis* was detected, strategies of prevention and control of abortion due to this agent must be taken to reduce the economic losses. Moreover, the presence of *S. typhimurium* is a hazard to public health and people who have close contact to sheep and goats.

- ***Please cite this paper as:*** Esmaeili H, Kalateh Rahmani H. Detection of *Salmonella* Carriers in Sheep and Goat Flocks of Bushehr and Lorestan Provinces, Iran. *J Med Bacterial.* 2016; **5** (3, 4): pp.50-53.

*Corresponding Author: Hossein Esmaeili, Department of Microbiology, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran.

Tel: +98-21-61117051, *Fax*: +98-2166933222, *E-mail:* hesmaeli@ut.ac.ir

Introduction

Salmonellosis is an infectious zoonotic disease caused by organisms of the two species of *Salmonella* (*S. enterica* and *S. bongori*) (8, 13). Although host-adapted serovars cause high mortality in both young and adult hosts *Salmonella abortusovis* (sheep-adapted serovar) shows low virulence in adult sheep. But it can induce abortion and mortality in the newborn lambs (9). Apparently, healthy animals can become subclinical carriers which can act as a reservoir for *Salmonella* and spread the infection by contaminating food and water (3, 5, 10). Food-borne and zoonotic salmonellosis is a major concern in countries with agro-pastoral type economy probably due to close contact between human and animals (1). According to epidemiological analysis, apparently healthy carriers are a crucial target for disease control because they shed the pathogen in high enough numbers to transmit the disease (3).

A number of studies conducted on small ruminants in Iran and all over the world have shown that *Salmonella* are prevalent in a wide range. While Lisa Scott et al. have reported the low prevalence of *Salmonella* (1.4%) in lambs and breeding adults of Ontario sheep flocks in 2011, Molla et al. also have shown 11.5% and 3% of apparently healthy slaughtered sheep and goats of central Ethiopia were positive for *Salmonella*, respectively (7, 11).

The objective of this survey was to detect the fecal carriage of *Salmonella* in healthy sheep and goats in Lorestan and Bushehr provinces.

Sheep and goats of 8 flocks in Bushehr and 15 flocks in Lorestan provinces were clinically examined. Total of 389 fecal samples were directly collected aseptically from the rectum of apparently healthy sheep and goats. Samples were transferred aseptically to 10 ml of selenite cystine and 10 ml of Rappaport–Vassiliadis broth and incubated for 18–24 h at 37 °C and 42 °C, respectively. A loopful of each enrichment broth was streaked on to pre-incubated brilliant green and xylose lysine deoxycholate agar and incubated at 37°C for 24 h. The plates were then examined for the presence of *Salmonella* colonies. Suspected colonies were inoculated in to TSI (Triple Sugar Iron agar), peptone water, Simmon's Citrate, Urea medium and MRVP. Serogroups were detected by antisera [Difco, USA] according to the manufacturer's instructions.

In the present study *Salmonalla* were isolated from 2 (1.05%) samples in Bushehr province. They both belonged to 4 years old ewes with history of abortion. *S. abortusovis* and *S. typhimurium* were detected in serotyping. All samples were negative for *Salmonella* spp. in Lorestan province.

The findings of the present study are in agreement with the report of Davies et al. which indicated that prevalence of *Salmonella* was very low in sheep and goats (0.1%) in Britain (2). Hjartardottir et al. reported prevalence of *Salmonella* spp. to be 1.3% in apparently healthy sheeps in Iceland (4). The current investigation used fecal samples for detecting *Salmonella*.

In contrast, Teklu and Negussie found higher prevalence of *Salmonella* in sheep and goats in an export abattoir in Ethiopia. They reported 7.7% and 11.7% of sheeps and goats were positive for *Salmonella*, respectively. One of the reasons for high prevalence reported in their study might be the use of mesenteric lymph nodes and caecal contents as samples (13). During another investigation in Iraq using fecal samples from slaughtered sheep in Basra, the incidence of *Salmonella* reported 7.2% (6). In studies of Saleh et al. samples were taken at slaughter houses where animals were under stress condition, e.g. the stress of transport, keeping animals in crowded waiting pens and holding in lairage (6, 13). In response to stress Norepinephrine can cause the recrudescence of *Salmonella* in carrier animals, increased colonization of the gut, increased shedding and consequently an increased contamination of the environment and other animals (13, 14).

Since salmonellosis is not a reportable disease in Iran neither in veterinary nor public health

sections, the actual incidence of this infection in Iran is unknown (12). Moreover, governmental organizations and private centers are not interested in investigation of salmonellosis in sheep and goats. Besides, the prevalence of *Salmonella* serovars is not well documented, as *Salmonella* are not routinely isolated and identified. Only a few studies have been reported with little comparable data on salmonellosis in small ruminants in some provinces of Iran. Tajbakhsh et al. during a study in Chaharmahal Va Bakhtiyari province detected 20 samples (3.63%) out a total of 550 raw cows, sheeps and goatss' milk samples were positive for *Salmonella* spp. They also showed that 7 samples (1.27%) were contaminated with *S. typhimurium* (12).

The low detection rate obtained in this study could be as a result of sampling under low stress condition on field, sampling from apparently healthy sheep and goats, intermittently shed of *Salmonella* from carriers, using fecal samples and detecting the bacteria by cultural isolation instead of using PCR-based techniques. Besides, the effect of difference in occurrence and distribution of *Salmonella* in the study population should not be ignored.

Conclusion

Our result suggests that the risk to the consumer from small ruminants' meat is low, especially when the meat will be cooked prior to consumption but the presence of carrier animal in flock could be a source of persistent infection in environment. Since *S. typhimurium* was detected in the current study in field condition, the risk of zoonotic salmonellosis especially in rural people, nomads and veterinarians who have close contact to livestock must be mentioned. This study showed that *S. abortusovis* may be one of the causes of infectious abortion in small ruminants of Iran. Further studies need to elucidate the real portion of abortions due to *S. abortusovis* among sheep of Iran to adopt proper control and prevention strategies according to its contribution. The data which is obtained during this study can be compared to results of later studies to evaluate the success of prevention and control programs of salmonellosis in population of small ruminants in these two provinces and similar conditions in other areas.

Acknowledgements

The authors would like to thank experts of Iran veterinary organization in Bushehr and Lorestan provinces for kind cooperation during sampling.

Conflict of interest

The authors declare that they have no conflict of interest.

Financial disclosure

This research was financially supported by research council of veterinary faculty of Tehran University, Iran.

References

1. Chandra M, Singh BR, Shankar H, et al. Prevalence of *Salmonella* antibodies among goats slaughtered for chevon in Bareilly (Northern India). *Prev Vet Med* 2007; **8**:1-8.
2. Davies RH, Dalziel R, Gibbens JC, et al. National survey for *Salmonella* in pigs, cattle and sheep at slaughter in Great Britain (1999–2000). *J Appl Microbiol* 2004; **96**:750-760.
3. Gopinath S, Carden S, Monack D. Shedding light on *Salmonella* carriers. *Trends Microbiol* 2012; **20**: 320-327.
4. Hjartardóttir S, Gunnarsson E, Sigvaldadóttir J. *Salmonella* in sheep in Iceland. *Acta Vet Scand* 2002; **43**: 43-48.
5. Markey BK, Leonard FC, Archambault M, et al. Collection and submission of diagnostic specimens. In: *Clinical*

Veterinary Microbiology, second Ed. MOSBY Elsevier, 2013: 3-7.
6. Mohammed Saleh WM. Isolation of *Salmonella* spp. from slaughtered sheep in Basra. *Bas J Vet Res* 2012; **11**: 159-166.
7. Molla W, Molla B, Alemayehu D, et al. Occurrence and antimicrobial resistance of *Salmonella* serovars in apparently healthy slaughtered sheep and goats of central Ethiopia. *Trop Anim Health Pro* 2006; **38**: 455-462.
8. OIE. Salmonellosis. in: OIE Terrestrial Manual 2010. [Internet]. 2010 [cited 2014 Aug 2014]. Available from: http://www.oie.int/fileadmin/Home/eng/Health_standards/tahm/2.09.09_SALMONELLOSIS.pdf
9. Pardon P, Sanchis R, Marly J, et al. Experimental ovine salmonellosis (*Salmonella Abortusovis*): pathogenesis and vaccination. *Res Microbiol* 1990; **141**: 945-953.
10. Prescott LM, Harley JP, Klein DA. Human Disease caused by bacteria. in: Microbiology. 5th ed. McGraw-Hill Science, Boston, USA, 2002: 899-940.
11. Scott L, Menzies P, Reid-Smith R, et al. Antimicrobial resistance in fecal generic *Escherichia coli* and *Salmonella* spp. obtained from Ontario sheep flocks and associations between antimicrobial use and resistance. *Can J Vet Res* 2012; **76**: 109-119.
12. Tajbakhsh F, Tajbakhsh E, Rahimi et al. Determination of antibiotic resistance in *Salmonella* spp. isolated from raw cow, sheep and goat's milk in Chaharmahal va Bakhtiyari Provience, Iran. *G V* 2013; **10**: 681-685.
13. Teklu A, Negussie H. Assessment of risk factors and prevalence of *Salmonella* in slaughtered small ruminants and environment in an export abattoir, Modjo, Ethiopia. *Am Eurasian J Agri Environ Sci* 2011; **10**: 992-999.
14. Verbrugghe E, Boyen F, Gaastra W, et al. The complex interplay between stress and bacterial infections in animals. *Vet Microbio*l 2012; **155**: 115-12.