RESEARCH ARTICLE

Studies on Subclinical Mastitis in Sirohi Goats in Southern Rajasthan with Reference to Prevalence and Diagnostic Aspects

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Abstract

Mastitis is an economically important disease in goats. In the present study, a total of 100 quarter milk samples were collected from 50 apparently healthy Sirohi Goats in Udaipur district. The culture examination of these samples revealed the prevalence of subclinical mastitis in Sirohi goats as 26 (26/100) % and 34 (17/50) % on udder quarter basis and animal basis, respectively. The highest prevalence of subclinical mastitis was observed in 3rd lactation (50 %). Among the different isolates, staphylococci were found as most prevalent organism accounting for 37.50 (12/32) %, followed by streptococci 28.12 (9/32) %, *E. coli* 18.75 (6/32) %, bacilli 9.37 (3/32) % and *Corynebacterium* spp. 6.25 (2/32) %. The threshold values of modified California mastitis test, total somatic cell count and electrical conductivity in subclinical mastitic milk samples were observed to be +1, 1.0 million cells/ml of milk and 6.0 mS/cm, respectively.

Keywords: Diagnostic tests, Prevalence, Subclinical mastitis, Sirohi goats, Udaipur district.

Ind J of Vet Sci and Biotech (2019): 10.21887/ijvsbt.14.4.15

Introduction

Sirohi is one of the important goat breeds and is mostly distributed in the southern part of Rajasthan, *i.e.*, outline areas of Arawali hills in Rajasthan. Sirohi is a compact to medium-sized, dual-purpose goat breed. There is increased demand for Sirohi goats all over the country due to good production performance, hardiness and disease resistance. It has the ability to withstand harsh climate conditions and adapt to various climatic conditions. Goat milk is an important source of nutritional security to the marginal farmers and landless laborers. Diseases of the mammary glands have always proved a bottleneck in dairy goat rearing (Gebrewahid *et al.*, 2012). Mastitis is an economically important disease due to its high morbidity, loss of milk production, high cost of treatment and major adverse effects on quality of by-products made from contaminated milk (Sharma *et al.*, 2005). Subclinical mastitis denotes the absence of gross abnormalities in the mammary gland, but the presence of chemical and bacteriological changes in the milk (Sharma *et al.*, 2004). Loss of milk production is more in subclinical mastitis. It is more hazardous because of the lack of perceptible symptoms of inflammation and no observable changes in the secreted milk (Sharma *et al.*, 2005). Therefore, the present investigation was undertaken to find out the prevalence of sub-clinical mastitis in Sirohi goats.

Materials and methods

In the present investigation, a total of 100 quarter milk samples from 50 apparently healthy Sirohi goats of different parity and lactation stage were collected aseptically. All the milk samples were subjected to various diagnostic tests like cultural examination (as per Cowan and Steel, 1975), total somatic cell count (as per Schalm *et al.*, 1971), electrical conductivity (by pen type digital conductivity meter) and modified California mastitis test (as per Schalm and Noorlander, 1957). The statistical analysis of the data was done using the statistical method described by Snedecor and Cochran (1994).

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How to cite this article: Sharma, S.K., Meena, H.K., Joshi, M. (2019). Studies on Subclinical Mastitis in Sirohi Goats in Southern Rajasthan with Reference to Prevalence and Diagnostic Aspects. Ind J of Vet Sci and Biotech., 14(4):56-58

Source of support: Nil

Conflict of interest: None

Submitted: 02/04/2019 **Accepted:** 04/04/2019 **Published:** 20/4/2019

Results and discussion

Prevalence

The quarter-wise prevalence of subclinical mastitis in Sirohi goats was found to be 26 and 25 % by bacteriological culture examination and electrical conductivity, respectively, whereas it was 27 % by both modified California mastitis test and total somatic cell count. Further, on the animal basis, the prevalence of subclinical mastitis by bacteriological culture and electrical conductivity was recorded as 34 and 32 %, respectively, whereas by both modified California mastitis test and total somatic cell count, the prevalence was found to be 36 %. Almost similar

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Table 1: Lactation-wise prevalence of subclinical mastitis in Sirohi goats

Lactation number	*Total number of animals examined*	*Number of animals positive for SCM*	*Percentage (%)*
I	5	2	40.00
II	18	6	33.33
III	12	6	50.00
IV	8	3	37.50
V	7	3	42.85

results have been reported by Ali Al-zainy and Salman Al-jeburii (2015), Kumar *et al*. (2016) and Ferdous *et al*. (2018). Prevalence of subclinical mastitis in Sirohi goats was lower than most of the studies in goats, and it might be because of hardy and disease resistant breed.

Lactation number wise prevalence of subclinical mastitis in Sirohi goats is depicted in Table 1. The highest prevalence of subclinical mastitis in Sirohi goats was observed in 3rd lactation (50%), followed by 5th (42.85%) and 1st lactation (40%). Similar findings were reported by Sharma *et al*. (2005) and Bhanot *et al*. (2017). The high prevalence of subclinical mastitis in 3rd lactation in the present study might be because of higher milk yield in this lactation as compared to other lactations and decreased immunity with advancing age. The prevalence of subclinical mastitis varies from farm to farm, depending upon the management system and hygienic and sanitary measures taken during milking (Radostitis *et al.,* 2007).

Bacteria associated with Subclinical Mastitis in Sirohi Goats

Total bacterial isolates in subclinical mastitis in Sirohi goats are presented in Table 2. In the present investigation, among the different isolates staphylococci were found as most prevalent organism accounting for 37.50 (12/32)%, followed by *Streptococci* as 28.12 (9/32)%, *E. coli* as 18.75 (6/32)%, *Bacillus* spp. 9.37 (3/32)%, and *Corynebacterium* spp. as 6.25 (2/32) %. Similar findings were reported by Saini *et al.* (1994) and Sharma *et al.* (2009).

Determination of Cut off Value of Various Diagnostic Tests

To determine the threshold values of the modified California mastitis test and total somatic cell count, bacteriological culture examination was considered as a gold standard test. It is reported as a gold standard test for mastitis diagnosis and selecting appropriate antibiotic according to the sensitivity (Sharma *et al*., 2009). In the present study, out of 100 milk samples, 26 were found positive on bacteriological culture examination. Thus, these samples were considered as subclinical mastitic milk. In these 26 culturally positive milk samples, the threshold value for the modified California mastitis test was recorded as +1. Wu *et al.* (1994) and Sharma *et al*. (2007) reported the same threshold value of the modified California mastitis test for detection of subclinical mastitis in goats.

Table 2: Total bacterial isolates in subclinical mastitic milk in Sirohi goats

S. No.	*Bacterial isolates*	*Total number of Samples (n=32)*	*Percentage (%)*
1.	Staphylococci	12	37.50
2.	Streptococci	9	28.12
3.	E. coli	6	18.75
4.	Bacilli	3	9.37
5.	Corynebacterium spp.	2	6.25

The mean somatic cell count in bacterial culture positive milk samples was 1.760 million cells/mL with the range from 1.046 to 4.864 million cells/mL. These milk samples had the somatic cell count above 1.0 million cells/mL. Therefore, the threshold value for total somatic cell count to detect subclinical mastitis in Sirohi goats was considered as 1.0 million cells/ml of milk. These findings are in agreement with that of Sharma *et al.* (2004).

The mean electrical conductivity in 26 bacterial culture positive milk samples was 8.79 ± 0.175 mS/cm with a range of 6.12 to 9.97 mS/cm. Thus bacterial culture positive milk samples had an electrical conductivity of more than 6.0 mS/cm. Therefore, the cut-off value to detect subclinical mastitis by electrical conductivity in Sirohi goats was decided as 6.0 mS/cm. Sharma *et al.* (2004) also reported 6.0 mS/cm as cut off criterion of electrical conductivity to detect subclinical mastitis in goats.

Further, out of 100 udder quarter milk samples, 27 were found positive for subclinical mastitis by modified California mastitis test and total somatic cell count. Out of these, 26 were found positive for pathogenic bacteria by bacteriological culture. One sample which was found positive with modified California mastitis test and somatic cell count (more than 1.0 million cells/ml) showed no bacterial growth. It may be because of the fact that this sample was having any other infection which was not attempted to culture in the present study, e.g. anaerobes, mycoplasma, fungi, etc.

Acknowledgments

Authors thank the Dean of the Navania Veterinary College and RAJUVAS, Bikaner authorities for support and facilities provided.

References

Ali-Al-Zainy, Z.O. and Salman Al-jeburii, K.O. (2015). Prevalence of gram positive bacteria in buffalo mastitis in Iraq. *Intl. J. Adv. Res*., 3(4): 216-225.

Bhanot, V., Mahla, O.P., Kamaldeep and Kumar, R. (2017). Prevalence of mastitis in goats. *J. Krishi Vigyan*, 6(1):232-233.

Cowan, S.T. and Steel, K.J. (1975). *Mannual for the Identification of Medical Bacteria*. Cambridge University Press, Cambridge.

Ferdous, J., Rahman, M.S., Khan, M.I., Khan, M.A.H.N.A, and Rima, U.K. (2018). Prevalence of clinical and subclinical caprine

mastitis of northern region in Bangladesh. *Progressive Agriculture*, 29(2): 127-138.

Gebrewahid, T.T., Abera, B.H. and Menghistu, H.T. (2012). Prevalence and etiology of subclinical mastitis in small ruminants of Tigray regional state, North Ethiopia*, Vet. World,* 5(2): 103-109.

Kumar, R., Gupta, D.K., Bansal, B.K., Singh, S., Sharma, S., Kumar, A. and Uppal, S.K. (2016). Prevalence, current antibiogram and risk factors associated with mastitis in dairy goats in Punjab. *Intl. J. Sci. Environ.Technol.*, 6:5.

Radostits, O.M., Gay, C.C., Blood, D.C., and Hinchcliff, K.W. (2007). Mastitis of goats. In: *Veterinary Medicine - A textbook of the disease of cattle, sheep, pigs, goats and horses*. 10th ed., W.B. Saunders Co., Philadelphia, USA, pp: 761-762.

Saini, S.S., Sharma, J.K. and Kwatra, M.S. (1994). Prevalence and etiology of subclinical mastitis among crossbred cows and buffaloes in Punjab. *Indian J. Dairy Sci.*, 47:103-106.

Schalm, O.W., Carroll, E.J. and Jain, N.C. (1971). *Bovine Mastitis*. Lea and Febiger, Philadelphia, pp. 76-77, 82, 104, 123, 144.

Schalm, O.W. and Noorlander, D.O. (1957). Experiments and observations leading to development of California mastitis test. *J. Am. Vet. Med. Assoc.*, 130:199-204.

Sharma, S.K., Tanwar, R.K., Gahlot, A.K. and Joshi, Monika (2004). Diagnosis of subclinical mastitis in goats. *Vet. Practitioner*, 5(2):107-108.

Sharma, S.K., Tanwar, R.K., Gahlot, A.K. and Joshi, Monika (2005). Prevalence of subclinical mastitis in goats. *Vet. Practitioner,* 6(1): 20-21.

Sharma, S.K., Tanwar, R.K., Gahlot, A.K. and Joshi, Monika (2007). Somatic cell count in relation to caprine subclinical mastitis. *Indian J. Vet. Med.*, 27(2):149-150.

Sharma, S.K., Tanwar, R.K., Gahlot, A.K. and Joshi, Monika (2009). Subclinical mastitis in goats. *Indian J. Vet. Med.*, 29(2): 106-107.

Snedecor, G.W. and Cochran, W.C. (1994). *Statistical Methods*. 8th ed. Oxford and IBH Publishing Co. New Delhi, India.

Wu, Y.H., Lin, S.C. and Liu, S.S. (1994). Efficacy of various diagnostic tests for the screening of subclinical mastitis in dairy goats. *J. Chinese Soc. Vet. Sci.,* 20(3):272-279.