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Occurrence study of clinical and subclinical mastitis in goats in different organized and unorganized sectors at Jabalpur (M.P.)

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Abstract

Mastitis, defined as inflammation of the udder, is one of the most important diseases in dairy goats globally, which most often occurs as a result of infections with different pathogenic agents, such as bacteria, fungi or viruses and is also associated with poor hygiene conditions. The present study was conducted for a period of six month i.e., from May to October, 2022 to know the occurrence of clinical and subclinical mastitis in goats of different organized and unorganized sectors of Jabalpur. A total of 313 lactating goats were tested using California Mastitis Test. Out of 313 goats, 155 goats were found positive for mastitis. The overall occurrence of mastitis in goats was 49.52% on animal basis and 48.62% on udder halves basis. Occurrence of clinical mastitis (CM) and subclinical mastitis (SCM) in goats was found to be 8.63% and 40.89%, respectively on animal basis and on udder halves basis it was recorded as 7.64% and 40.97%, respectively. Sector wise occurrence was significantly higher in SCM in goats reared under unorganized sector. Significantly higher occurrence of CM (16.00%) and SCM (60.00%) was seen in the goats of age group above 4 years. Parity wise occurrence was significantly higher in goats above fourth parity in CM (16.28%) and in second parity in SCM (57.33%). Significantly higher occurrence of CM (13.74%) and SCM (47.33%) was seen in early lactation stage. Breed wise occurrence was non-significant in both CM and SCM in goats.

Keywords: Clinical mastitis, subclinical mastitis, Goats, CMT

Introduction

Goats are one of the economically important livestock in world and often described as a poor man's cow (or mini-cow) because of its immense contribution to the poor man's economy. They are most commonly reared by the landless agricultural labourers, marginal and small farmers of the rural India. The Goat "a mini cow" is a potential source of meat, milk, skin, fibre and its population in the country is 148.88 million showing an increase of 10.1% over the previous census (Livestock census, 2019) [10]. The wide range of utility is combined with its docile, intelligent, graceful and frugal nature (Shrivastava, 2008) [18]. Goat milk is highly nutritious and has a similar nutritional profile to those of human's breast milk. India ranks first in goat milk production accounting for about 26.31% global goat milk production. Total milk production in the country is 155.5 million tonnes of which goat milk contribute for about 3 percent of total milk production.

Out of various diseases, mastitis is a problem faced by the farmers since domestication of milch animals. Mastitis, defined as inflammation of the udder, is one of the most important diseases in dairy goats globally, which most often occurs as a result of infections with different pathogenic agents, such as bacteria, fungi or viruses and is also associated with poor hygiene conditions. Mastitis, defined as inflammation of the udder, 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.* 2007) [15].

Mastitis is presented in two major forms *viz.* clinical mastitis (CM) and subclinical mastitis (SCM). Effect of various pre-disposing factors *viz.* age, breed, stage of lactation, parity, environmental conditions, injury of teat or udder, teat sores and managemental condition like inadequate stall space, thorny grazing area, dampness, method of milking, inadequate hygiene, insufficient bedding, type of floor and improper feeding are important in the development of the disease (Kumar *et al.*, 2016) [8].

Materials and Methods

The proposed work was conducted in the Department of Veterinary Medicine, College of Veterinary Science and Animal Husbandry, Nanaji Deshmukh Veterinary Science University, Jabalpur, Madhya Pradesh. For this study, a total of 313 goats were screened from May 2022 to October 2022. Occurrence study was conducted in goats of organized and unorganized sectors viz. goats from livestock farm Amanala, Livestock Farm Complex (LFC), Adhartal, NDVSU, Jabalpur, goats brought to VCC, College of Veterinary Science & A. H. Jabalpur and goats from unorganized sectors of Sadar, Ranjhi, Gohalpur, Madar Tekri, Ghamapur, Maharajpur, Ranital and Raddi Chowki. Goats were screened on the basis of history, presence of clinical symptoms and CMT. Complete history and patient specific data i.e. age, breed, stage of lactation, parity, drop in milk yield, number of teats affected etc. was recorded in each goat. The udder was subjected to clinical examination by manual palpation of each individual udder half and the teats to ascertain whether the abnormality was unilateral or bilateral. Milk was expressed from individual halves and examined for abnormalities such as discoloration, clots or flakes, pus, blood staining and consistency. For collection of milk, udder of each goat was thoroughly washed with potassium permanganate (0.01 percent) and wiped with clean cloth. About 7 ml of midstream milk were collected aseptically from each half separately in sterilized vials and was transported (in ice box) to the department for further examination. Collected milk samples were used for performing CMT. A squirt of milk, about 5 ml from each udder half was placed in each of 2 shallow cups in the CMT plastic paddle. An equal amount of CMT reagent was added to the milk. The paddle was rotated to mix the contents with minimum agitation.

Table 1: CMT score on the basis of formation of gel

CMT score	Reaction
Negative	No reaction
Trace	Slight slime
1	Distinct slime but without gel
2	Immediate gel formation; moves as a mass during swirling
3	Gel develops a convex surface and adheres to the bottom of the cup

Interpretation of result was done according to Shearer and Harris (1992) i.e. milk from non-infected glands yielded a 'negative', 'trace' or '1' scores and scores of '2' or '3' indicated mastitis. Statistical analysis of data of occurrence studies was done by using Chi square test.

Results and Discussion

Overall occurrence of mastitis in goats at Jabalpur

A total of 313 lactating goats were tested using California Mastitis Test. Out of 313 goats, 155 goats were found positive for mastitis. The overall occurrence of mastitis in goats during May 2022 to October 2022 was 49.52% on animal basis and 48.62% on udder halves basis (Table 2).

Table 2: Overall occurrence of mastitis in goats at Jabalpur

Particulars	No. Screened	No. Positive	Occurrence (%)
Total number of goats	313	155	49.52
Total number of udder halves	615 (11 blind teat)	299	48.62

Occurrence of clinical and subclinical mastitis in goats

Out of 313 screened goats, 27 goats (having CMT score +3) were found positive for clinical mastitis and 128 goats (having CMT score +2) were found positive for subclinical mastitis. On animal basis, the occurrence of CM and SCM was 8.63% and 40.89%, respectively and on udder halves basis the occurrence of CM and SCM was recorded as 7.64% and 40.97%, respectively (Table 3).

Table 3: Occurrence of clinical and subclinical mastitis in goats at Jabalpur

Particulars	No. Screened	CM (%)	SCM (%)
Total number of goats	313	27 (8.63)	128 (40.89)
Total number of udder halves	615	47 (7.64)	252 (40.97)

The results of present study indicated the occurrence of mastitis in goats at Jabalpur, although there is variation in the occurrence rates with the results of previous workers. In the present study preliminary screening for mastitis was done with the help of California mastitis test (CMT) as it is a widely accepted test for identification of SCM. The score of CMT depends upon the reaction between reagent and milk in terms of gel formation. Previous studies reported that the prevalence of mastitis in goats were 35.54% (Raikwar and Shukla, 2015) [13] and 73.01% (Bhanot *et al.*, 2017) [14]. The prevalence of SCM mastitis was reported as 66% (Amarwal, 2011) [2], 33.9% (Baurabh *et al.*, 2013), 38.75% (Ferdous *et al.*, 2018) [6]. These observations revealed that the prevalence of caprine mastitis varies in different regions. These variations might be attributed to the variation in feeding practices, managemental practices and environmental conditions at different geographical area. Moreover, difference in study design and methodology might have also contributed towards the varying rates of occurrence of mastitis in goats.

Occurrence of CM and SCM on the basis of involvement of udder halves

Among 27 positive cases of CM, 18 (66.66%) had unilateral (Right udder-13, Left udder-5) involvement of udder half while 9 (33.33%) goats had bilateral involvement. Among 128 positive cases of SCM, 94 (73.43%) had unilateral (Right udder-56, Left udder-38) involvement of udder half while 34 (26.56%) had bilateral involvement (Table 4).

Table 4: Occurrence of CM and SCM on basis of involvement of udder halves at Jabalpur

Particulars	Total positive	Unilateral	Right udder	Left udder	Bilateral
CM	27	18 (66.66%)	13	05	9 (33.33%)
SCM	128	94 (73.43%)	56	38	34 (26.56%)

In this study the animal wise and udder halves wise CM was detected as 8.63% and 7.64% respectively. Similarly SCM was reported as 40.89% (animal wise) and 40.97% (udder halves basis). More or less similar findings were observed by Amarwal (2011) [2] who reported SCM in goats on udder half basis as 46% and on animal basis 66%. On the basis of involvement of udder halves highest prevalence was reported in the right udder in both CM (66.66%) as well as SCM (73.43%). Similar findings were reported by Swai *et al.*, 2008 [20] who reported higher prevalence of mastitis in right udder halves. However, Al-Ramahi and Al-Nassarbi (2007) reported insignificant difference of affection in both the udder halves.

Sector wise occurrence of mastitis in goats

To know the sector wise occurrence of caprine mastitis at Jabalpur, goats reared under different conditions were studied and categorized into two sectors i.e. organized and unorganized sector of rearing. The occurrence of SCM was recorded significantly higher in unorganized sector i.e. 44.53% (110 out of 247) as compared to organized sector i.e. 27.27% (18 out of 66) (Table 5).

Table 5: Sector wise occurrence of mastitis in goats at Jabalpur

Particulars	Goats screened	Goats with CM (%)	Goats with SCM (%)
Unorganized sector	247	21 (8.50)	110 (44.53)
Organized sector	66	06 (9.09)	18 (27.27)
χ^2 Value		0.023 ^{NS}	6.421*

*significant at $p < 0.05$, NS- Non significant

The pattern of sector wise occurrence correlates well with the findings of Singh *et al.* (2019) [19], who reported higher prevalence of mastitis in unorganized sectors. However, contrary findings were reported by Mahlangu *et al.* (2018) [11] who reported higher prevalence of mastitis in goats residing in houses i.e. organized sector. The probable reason for higher occurrence of mastitis in unorganized sector might be due to poor hygiene management, lack of awareness about milking methods and general environmental conditions of rearing goats.

Age wise occurrence of mastitis in goats

To know the age wise occurrence of caprine mastitis, goats of

varying ages were studied and categorized into four categories. The occurrence of CM was recorded significantly higher in goats of more than 4 years of age group i.e. 16.00% (12 out of 75) and the occurrence of SCM was recorded significantly higher in goats of more than 4 years of age group i.e. 60.00% (45 out of 75) (Table 6).

Table 6: Age wise occurrence of mastitis in goats at Jabalpur

Age group	Goats screened	Goats with CM (%)	Goats with SCM (%)
1-2 years	61	02 (03.28)	15 (24.59)
2-3 years	98	04 (04.08)	33 (33.67)
3-4 years	79	09 (11.39)	35 (44.30)
>4 years	75	12 (16.00)	45 (60.00)
χ^2 Value		10.72*	20.53**

*significant at $p < 0.05$, **significant at $p < 0.01$

The results of present study is in accordance with Ferdous *et al.* (2018) [6] and Singh *et al.* (2019) [19] who reported that chances of occurrence of mastitis progressively increases with age. Age is one of the most important factors in the occurrence of mastitis in goats. Increased occurrence of mastitis in older goats might be due to prolonged period of exposure to the pathogens as compared to young animals.

Breed wise occurrence of mastitis in goats

The occurrence of CM and SCM was studied in different breeds of goats at Jabalpur (Table 7).

Table 7: Breed wise occurrence of mastitis in goats at Jabalpur

Breeds	Goats screened	Goats with CM (%)	Goats with SCM (%)
ND	131	09 (06.87)	61 (46.56)
Jamunapari	065	04 (06.15)	29 (44.62)
Sirohi	055	07 (12.73)	22 (40.00)
Black Bengal	017	02 (11.76)	05 (29.41)
Barbari	045	05 (11.11)	11 (24.44)
χ^2 Value		2.75 ^{NS}	8.09 ^{NS}

NS- Non significant

Variable results regarding breed wise occurrence of mastitis in goats were reported by different scientist. Mishra *et al.* (2018) [12] reported no significant difference in the prevalence of SCM in Barbari and Jamunapari goats. However, Kumhar and Shukla (2017) [9] reported higher occurrence of SCM mastitis in Jamunapari breed of goats. The variability in the occurrence of caprine mastitis among different breeds might be the result of difference in genetic resistance, hygiene

management and milking practices adopted.

Parity wise occurrence of mastitis in goats

The occurrence of CM was recorded significantly higher in goats of more than fourth parity i.e. 16.28% (14 out of 86) and the occurrence of SCM was recorded significantly higher in second parity i.e. 57.33% (43 out of 75) (Table 8).

Table 8: Parity wise occurrence of mastitis in goats at Jabalpur

Parity	Goats screened	Goats with CM (%)	Goats with SCM (%)
1	57	03 (05.26)	21 (36.84)
2	75	04 (05.33)	43 (57.33)
3	95	06 (06.32)	31 (32.63)
>4	86	14 (16.28)	33 (38.37)
χ^2 Value		8.88*	11.68**

*significant at $p < 0.05$, **significant at $p < 0.01$

The results of present study are in accordance with the findings reported by Razi *et al.* (2012) [14], Ferdous *et al.* (2018) [6] and Mahlangu *et al.* (2018) [11]. In the present study, occurrence of CM was higher in goats of above fourth parity. Suggestive reason for it is that as the age advances there may

be added burden and stress on to the body due to milk production for longer period and multiple numbers of parities. Moreover, increasing age and number of parity may also contribute to widening of teat canal, thus making the udder more prone to infection by entry of microorganism through

teat canal. The variation in the occurrence of SCM may be probably due to variable rearing and management conditions.

Lactation stage wise occurrence of mastitis in goats

To know the lactation stage wise occurrence of caprine mastitis, goats of varying lactation stages were studied and categorized into three stage of lactation (Table 9).

Table 9: Lactation stage wise occurrence of mastitis in goats at Jabalpur

Lactation stage	Goats screened	Goats with CM (%)	Goats with SCM (%)
Early	131	18 (13.74)	62 (47.33)
Mid	109	06 (05.50)	46 (42.20)
Late	073	03 (04.11)	20 (27.40)
χ^2 Value		7.58*	8.71*

*significant at $p < 0.05$

The occurrence of CM was recorded significantly higher in early lactation stage i.e. 13.74% (18 out of 131) and the occurrence of SCM was recorded significantly higher in early lactation stage i.e. 47.33% (62 out of 131).

The results of present study correlates well with the reports of earlier scientist (Bergonier *et al.*, 2003 and Islam *et al.*, 2011)^[3, 7] who also reported higher occurrence of mastitis in early lactation stage. This might be attributed to the fact that early lactation is a period of sucking and milking, so there are fair chances of transmission of infection between animals. Moreover, injury to the teat and udder during suckling can facilitate access of microorganism into the udder leading to mastitis. Apart from this, residual infection in the udder may flare up during early lactation period on account of physiological stress on the animal.

Conclusion

The overall occurrence of caprine mastitis was 49.52%, out of this 8.63% was clinical and 40.89% was subclinical. Significantly higher occurrence was seen in early lactation stage, in second parity in subclinical mastitis (57.33%) and above fourth parity in clinical mastitis (16.28%).

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