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HOST FACTORS ASSOCIATED WITH THE PREVALENCE OF CLINICAL MASTITIS IN LACTATING GOATS AT CHATTOGRAM CITY CORPORATION AREAS IN BANGLADESH

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ABSTRACT

Background: Mastitis is a multi-factorial and complex contagious disease of animal and public health importance associated with heavy economic loss in dairy industry worldwide. Some inland reports on the prevalence of sub-clinical mastitis (SCM) have been published but reports on clinical mastitis (CM) in lactating goats are very limited in Bangladesh.

Objective: The aim of this study was to determine the impact of host factors associated with the prevalence of CM in lactating goats of Chattogram City Corporation areas (CCCA).

Materials and Methods: This study included 100 selected lactating goats brought for treatment at the two Veterinary medical hospitals which include TVH, CVASU and Upazila Veterinary Hospital, CCCA in Bangladesh during the month of April 2019. The CM was diagnosed in each of the selected lactating goats by visual inspection and physical palpation methods of teat and udder and abnormalities of milk.

Results: This study examined clinically 100 lactating goats brought for treatment at the two veterinary hospitals at the CCCA, of which 43.0% affected with CM. Host factors including breeds, age, parity and lactation periods were used to detect their influence on the prevalence of CM in lactating goats. Higher prevalence of CM was recorded in Jamnapari (48.21%) in comparison to crossbred (37.5%) and Black Bengal (33.33%) goats. Higher prevalence of CM was observed in goats aged between 3 and 4 years (53.66%) in comparison to < 2 years (28.57%), 5-6 years (44.44%) and >6 years (50.0%). Influence of parity on the higher prevalence of caprine mastitis was observed during 3 to 4 parities (58.06%), followed by > 6 (28.57%) and < 2 (26.67%) parities. Similarly higher prevalence of CM was recorded in late (60.0%) in comparison to mid (43.90%) and early (33.33%) lactations.

Conclusions: An overall 43.00% prevalence of CM recorded in lactating goats at the CCCA where goats are mainly maintained in both semi-intensive and intensive management systems. This study showed some association exists between the host factors and prevalence of CM in lactating goats which suggests the need for prevention of mastitis in goats considering these host factors.

Keywords: Clinical mastitis, Lactating goats, Clinical examination methods, Host factors

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INTRODUCTION

The global goat population has been increasing dramatically and estimated to be over one billion due to changing incomes and food preferences in human populations and climate change limiting areas for raising large ruminants,[1] whereas it has been estimated to be 26.435 million goats in Bangladesh.[2] Goats are multifunctional versatile animal providing meat and milk for human consumption, skin for foreign currency earning, income and poverty reduction for smallholders, employment generation in rural areas and cash income for women in Bangladesh. It gains much importance among farmers due to its higher prolificacy and short generation interval. Lactating goat has been described as a 'poor man's cow' (mini-cow) because the goat eats little, occupies a small area and produces enough nutritious and easily digestible milk for the average unitary family, feeding, milking and care of goats does not require much facilities, equipment and hard work, easily managed by women and children, capital investment and feeding costs are low, whereas maintaining a cow at home cannot be afforded by the home owner, hence, the growing popularity of goat as the 'poor man's cow.' The importance of this valuable genetic resource is underestimated and its extent of contribution to the livelihood of the poor rural people is inadequately understood in Bangladesh. They are often neglected in comparison with large ruminants.[3] Part of this attitude towards them can probably be due to recognition of their capability, rather any prejudices against them and it is believed that goats are intelligent, independent, agile, resistance to many diseases and parasites and can look after themselves much better than other livestock species.[4] However, goat production and productivity and goat farmers' source of complementary income are far below the expectations due to infectious and parasitic diseases, malnutrition, low genetic potential and poor management practices in Bangladesh. Contagious diseases are a threat to animal health and productivity and mastitis is the most widely prevalent and costly contagious disease affecting lactating animals in all over the world. Review of 30 published reports on the clinical prevalence of caprine mastitis for which 47879 lactating goats have been examined clinically revealed that the 1199 (2.50%) animals affected with clinical mastitis in Bangladesh.[3] This indicates that the clinical caprine mastitis has a low incidence but it is often very severe and even associated with gangrenous mastitis.[5] Mastitis is a multi-etiological and complex disease which is defined as inflammation of parenchyma of mammary gland and characterized by physical, chemical and bacteriological changes in milk and pathological changes in the glandular udder tissues.[8] The occurrence of the disease is an outcome of interaction between the infectious agents, host resistance and environmental factors, however most cases are associated with bacterial pathogens. Mastitis is a global problem in lactating animals including goats and it adversely affects animal and public health, quality of milk and the economics of milk production associated with huge financial losses. Mastitis occurs both in clinical and sub-clinical forms, of which clinical type is characterized by cardinal signs of inflammation (hard, swelling, redness and pain) of the affected udder and reduced and altered milk secretion with the presence of clots and flakes in the milk of the affected halves or quarter, whereas SCM remains undiagnosed due to absence of any clinical signs. Economic losses caused by mastitis are mainly due to decreased milk production and changes its quality and composition, increased veterinary medical expenses, increased morbidity and mortality of kids, and premature culling

of affected goats.[7]Risk factors on the prevalence of mastitis have been reported to be associated with increased parity, poor BCS, increased milk production, late lactation stage, long teat, poor management and hygiene, teat injuries and wrong milking methods.[7-10] and elsewhere.[11] However, the reports on the prevalence of CM in goats along with its risk factors are very limited from CCCA.[9] This paper describes the host factors associated with the prevalence of CM in lactating goats of the CCCA in Bangladesh.

MATERIALS AND METHODS

This study included 100 randomly selected lactating goats brought for treatment at the two Veterinary medical hospitals which include Teaching Veterinary Hospital, CVASU and Upazila Veterinary Hospital, CCCA in Bangladesh during the month of April 2019. These lactating goats were brought for treatment by the owner with different problems including suspected udder problems.

A structured questionnaire was developed for the owners to obtain information of farmers and farms, animals and diseases. Some of these information includes name, age, sex, educational status and address of the owners, goat related information includes breed, flock size, number of goat including lactating goats, age, parity, milk yield, lactation month, type of housing, floor system, agricultural land size and also about the history of previous occurrence of diseases.

The three types of breeds of lactating goats including Black Bengal, Jamnapari and their crosses were brought for treatment at the hospitals during this study period. The genotype of goat was ensured by their pedigree information, breeding data and by farmer's interview and from phenotypic characters and milk production. Only 100 lactating available goats were selected for this study at both the hospitals during the study period which were brought for treatment from the different areas of CCCA, Bangladesh.

Each of the selected lactating goats was clinically examined initially by visual inspection followed by thorough palpation to detect any abnormalities especially inflammatory reaction (red, hot, hard and/or painful) of the teat and udder. The apparently healthy udder (Photo 1-3) and the diagnosis of the CM affected udder (Photo 4-6) were confirmed with the comparison of the differences between the normal and inflamed udders of lactating goats by visual and physical palpation methods and finally on detection of the abnormalities (clot, flakes, color) of milk.[6]

Statistical analysis

Data related to socio-economic status of dairy farmers, breeds, milk production, age, parity, lactation period and others related to clinical mastitis were cleaned for errors and incompatibilities, coded and analyzed by using the standard Chi-square test[12]

RESULTS

All the randomly selected 100 lactating goats' owners were interviewed at both the two veterinary hospitals at the CCCA. The most of the goat owners (88.0%) were found educated and the higher percentage (63.0%) of female owners rearing goats in comparison to male (27.0%) owners. Among the 100 lactating goats brought for treatment at the two Veterinary

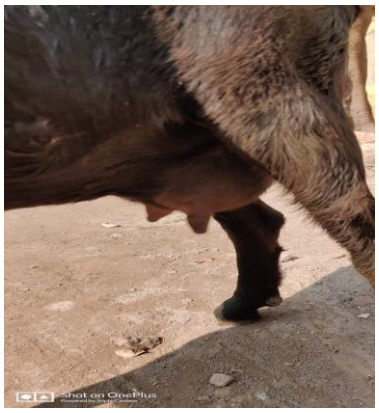

Photo 1. Normal udder of a lactating Black Bengal doe

Photo 2. Normal udder of a Jamnapari lactating doe

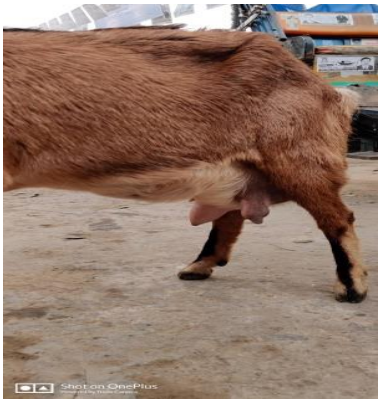

Photo 3. Normal udder of a cross-bred lactating doe

Photo 4. Clinical mastitis affected udder of a Black Bengal doe showing inflammatory reaction.

Photo 4. Clinical mastitis affected udder of a Jamnapari doe showing passing of bloody milk from a teat.

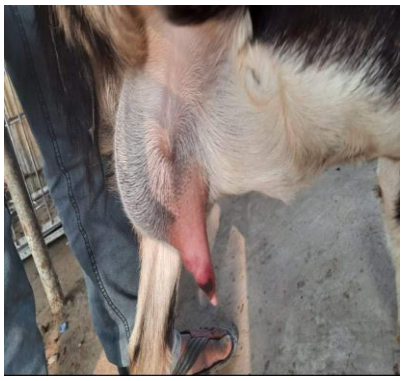

Photo 4. Clinical mastitis affected udder of a crossbred doe showing inflammatory reaction.

hospitals in Chattogram during one month period, of which 43.0% were affected with CM (Table 1). The different host factors associated with the prevalence of CM in lactating goats was analyzed (Table 1). Non-significantly ($p > 0.05$) higher percentage of clinical prevalence of caprine mastitis was recorded in Jamnapari breed (48.21%) in comparison to crossbred (37.50%) and Black Bengal (33.33%) lactating goats (Table 1).

It appears from the Table 1 that the clinical prevalence of caprine mastitis was non-significantly higher in lactating goats > six years (50.0%) in comparison to lower age groups. Non-significantly higher clinical prevalence of caprine mastitis was recorded in lactating goats between 3 and 4 parity (58.06%) in comparison to higher and lower parity (Table 1). Analysis of the clinical prevalence of mastitis in lactating goats based on lactation period showed higher prevalence of mastitis in late lactation (60.0%) in comparison to early (33.33%) and mid (43.90%) lactation (Table 1).

Table 1. Host risk factors associated with the prevalence of clinical mastitis in 100 lactating goats admitted to the two Veterinary hospitals in Chattogram City Corporation areas

SN	Variable	Level	No. of cases	Affected with CM		X^2 value	P value
				No.	%		
1.	Breed	Black Bengal	12	04	33.33	0.5982	0.741484
		Jamnapari	56	27	48.21		
		Cross-bred	32	12	37.50		
2.	Age (years)	< 2	35	10	28.57	2.0745	0.557083
		3-4	41	22	53.66		
		5-6	18	08	44.44		
		>6	06	03	50.00		
3.	Parity	1-2	30	08	26.67	3.3415	0.341912
		3-4	31	18	58.06		
		5-6	25	13	52.00		
		>6	14	04	28.57		
4.	Lactation period (month)	Early (1-2)	39	13	33.33	1.4812	0.476839
		Mid (3-4)	41	18	43.90		
		Late (>4)	20	12	60.00		
		Overall	**100**	**43**	**43.00**		

DISCUSSION

Goat has been economically important to people living in arid, semiarid, hilly and remote tribal areas because of its tolerance to hash weather conditions, ability to feed on inferior quality crop residues, high prolificacy, short gestation period and high rate of growth.[13] Goat is a source of meat, milk, skin and hides, and financial security for families of lower most income groups but the goat production is hampered due to high rate of disease incidence, inadequate services required for breeding, veterinary medical services and marketing system of meat and milk in Bangladesh. Caprine mastitis has become one of the most frequently diagnosed diseases in lactating goats with significant economic impact on the goat production associated with reduction of productivity of animals and farm profitability.

The CM presents significant clinical manifestations of inflammatory signs in the udder and abnormal udder secretions which are detected in 43.00% lactating goats in this study which is relatively higher than most of the reports on caprine CM published from Bangladesh[3,9] and elsewhere.[11] The 5.27%,[7] 4.54%[8] and 3.0%[9] prevalence of CM in lactating goat in different areas in Bangladesh have been reported. This variation of high prevalence of CM in lactating goat in this study might be due to calculation of the percentage of prevalence with considering the only lactating goat population brought for treatment at the hospitals. However, the prevalence of CM in goat population cannot be detected based on hospital cases, because smallholder goat owners sometimes have not enough time to bring all the clinically affected lactating goats, even initially treated by the village doctors, moreover the prevalence cannot be detected without knowing the whole population of both infected and non-infected lactating goats in the areas.

The prevalence of non-significantly higher clinical mastitis in Jamnapari breed (48.21%) than crossbred (37.50%) and Black Bengal (33.33%) goats recorded in this study which correlates with the milk production.[9,10] Non-significantly higher prevalence of CM recorded aged group between 3 and 4 years (53.66%) and > 6 years (50.0%) in comparison to < 2 years (28.57%) and between 5 to 6 years (44.44%) in lactating goats. Higher prevalence of CM recorded between 3 to 4 parity (58.06%) in comparison to lower (26.67%) and higher parities which might be due to highest milk production during the 3 to 4 parities in lactating animals. An increased tendency on the prevalence of CM in lactating goats recorded lowest from early (33.33%), followed by mid (43.90%) and highest in late (60.0%) lactation which might be due to repeated exposure to mastitis inducing pathogens.[10] However, both the CM and SCM have been reported to be significantly associated with age, parity, lactation stage, litter size and teat lesions,[8] rainy season, poor BCS and non-native goats breeds.[9] These inland observations are in support with the report of higher prevalence of CM and SCM in lactating goats with increased parity, late stage of lactation, poor BCS and rainy season.[11]

CONCLUSIONS

The clinical and sub-clinical prevalence of mastitis in lactating goats based on hospital case records of Chattogram City Corporation areas have been reported earlier in two separate articles. This paper describes the host factors associated with the prevalence of clinical mastitis in three breeds of lactating goats with higher prevalence in Jamnapari breed in comparison to Black Bengal and their crosses which indicates that higher hygienic management would be required to rear non-native breeds of goats in Bangladesh.

ETHICAL APPROVAL

This study was based on the clinical surveillance of clinical mastitis in lactating goats in accordance with the guidelines laid down by the International Animal Ethical committee and in accordance with Local Laws and Regulations in Bangladesh.

CONFLICT OF INTERESTS

No conflict of interests to declare

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