Prevalence of Sub-Clinical Mastitis in Buffaloes at Livestock Research and Development Station, Paharpur and Surroundings of Tehsil Paharpur District D.I. Khan, Khyber Pakhtunkhwa, Pakistan

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Abstract

Mastitis is one of the most important and economic disease of dairy industry worldwide. Sub-clinical mastitis causes hidden losses in terms of milk production and is not observed by the animal owners. The present study was conducted to determine the prevalence of sub-clinical Mastitis in Buffaloes at LR&DS, Paharpur and surroundings of Tehsil Paharpur district D.I. Khan, Khyber Pakhtunkhwa, Pakistan. Milk samples were collected from apparently mastitis free 2000 quarters of 500 buffaloes. The samples were subjected to California Mastitis Test (CMT). The overall prevalence was 27.6% and incidences were higher in hindquarters than forequarters. Total numbers of quarters affected with sub-clinical mastitis were 291 out of 2000 in buffaloes. Among these, 54(18.55%) were right fore, 84(28.86%) right hind, 51(17.52%) left fore and 102(35%) left hind quarters. The incidence of sub-clinical mastitis was also observed owing to the certain risk factors, *i.e.* are age, lactation numbers, stage of lactation, method of milking and type of housings were the important risk factors advancing the occurrence of sub-clinical mastitis. The prevalence of sub-clinical mastitis was found highest in the adult age group buffaloes *i.e.* 35.38% than young age buffaloes *i.e.* 14.86%. Higher prevalence was noted in 7-9 lactation number *i.e.* 49.25% followed by 4-6 lactation number *i.e.* 28.52%. Prevalence was higher in the late lactation stage *i.e.* 31.69% than early lactation stage i.e. 29.34% respectively. The sub-clinical mastitis prevalence was found more in the knuckling method of milking 31.19% followed by the full hand *i.e.* 17.70 %. The nature of housing had higher prevalence in kutcha type 31.69% and 26.18 % in puccka type was seen. The results of statistical analysis revealed that no significant difference observed in infection amongst the stage of lactation, housing of the animal and lactation number. Age groups and method of milking were found statistically significant (P<0.05).

Keywords: Prevalence; Sub-clinical mastitis; Buffaloes; Risk factors; California Mastitis test

Introduction

Mastitis is the inflammation of myoepithelial cells of the udder with physical, chemical and microbiological changes characterized by an increase in the number of somatic cells, mainly leukocytes in the milk and by the pathological changes in the mammary gland tissues. Mastitis is considered as one of the most important and economic disease of dairy animals [1]. Apart from causing massive economic losses, the disease also possess the risk for the transmission of zoonotic diseases like brucellosis, leptospirosis, tuberculosis and streptococcal sore throat to human population [2].

Mastitis is divided into two types: Clinical and subclinical. Clinical Mastitis (CM) is characterized by visible alterations in milk (e.g., clots, colour changes, consistence and decreased production) associated with inflammatory signs of the udder (e.g., redness, swelling, heat, or pain) or (e.g., dehydration, hyperthermia, and lethargy) [3]. Sub-Clinical Mastitis (SCM) is considered as the most economically important type of mastitis because of its higher prevalence and long term distressing effects as compared to clinical mastitis. Sub-clinical Mastitis is asymptomatic; therefore, produced milk appears to be normal. Sub-clinical mastitis shows no apparent changes in the milk. However, production of milk can be reduced up to 80% due to sub-clinical mastitis. If the disease persists for long period of time, it adversely affects milk quality [4]. As compared to clinical mastitis, detection of early subclinical mastitis in animal is very difficult for saving dairy buffaloes and decline of losses of farmers. Considering the physical and chemical changes of milk, a number of methods have been developed for identification of sub-clinical mastitis [5]. Amongst the tests, California Mastitis Test (CMT), Surf Field Mastitis Test (SFMT) and White Side Test (WST) are feasibly the reliable screening tests for sub clinical mastitis. The CMT is one of the simple, low-cost and rapid screening tests for sub-clinical mastitis [6]. Timely detection of mastitis animal is essential for most of the dairy farmers to decrease production fatalities and to improve prospects of retrieval [7].

Sub-clinical mastitis has remained the major cause for decline in production of dairy animals as a silent epidemic all the times in Pakistan. A questionnaire-based cross sectional study was conducted to assess the prevalence for sub-clinical mastitis in Tehsil Paharpur region District D.I. Khan, Khyber Pakhtunkhwa, Pakistan using an easy California Mastitis Test (CMT) method.

Materials and Methods

Study area

The research study was conducted at Livestock research and development station, Paharpur and surrounding of Tehsil Paharpur District D.I. Khan Khyber Pakhtunkhwa, Pakistan.

Sample size

A total of 500 milk samples were collected from the station animals of LR&DS Paharpur and surroundings of Tehsil Paharpur region District D.I. Khan. The study animals were lactating buffaloes.

Sampling method

Prior to milk collection for mastitis screening, clinical examination was performed on the every lactating buffalo thorough palpation of the udder to identify any fibrosis, swelling and other clinical signs. Watery milk, milk with pus or clots and blind quarters were also examined. Identification of at least one of these sign was sufficient to consider the mammary quarter as positive to Clinical Mastitis (CM) and were excluded from the study (Quinn et al., 2011). A plastic paddle with four (04) shallow cups marked as the Right-Fore (RF), Right-Hind (RH) and Left-Fore (LF), Left-Hind (LH), were used in order to detect individual quarter occurrence of sub-clinical mastitis. About 2 ml-3 ml of first striping of milk (fore milk) was taken from the individual quarter in the separate cup of paddle. Then equal amount of CMT reagent was then added to each cup of paddle. The content was then mixed properly by gentle circular motion of paddle in

horizontal plane. The sample was then observed for precipitation or gel formation. If there was formation of gel like substance, CMT was said to be positive and quarter was noted as infected with sub-clinical mastitis. But, if the solution remains watery, the CMT was considered negative, showing the quarter was not affected with SCM. The data regarding sub-clinical mastitis of each individual quarter was recorded [8].

Statistical analysis

A tabular analysis of the data collected was used to achieve the objectives of the study. A student 't' test used to test the levels of significance between the normal milk and sub-clinical mastitis affected milk by Snedecor and Cochran [9]. A Chi-square test used to determine the level of significance amongst the effect of risk factors of the sub-clinical mastitis in dairy animal by Chandel [10]. P values less than 5% was considered statistically significant.

Result and Discussion

The overall prevalence of subclinical mastitis in dairy animal

The present research study was conducted to determine the prevalence of sub-clinical mastitis in Buffaloes at LR&DS, Paharpur and surroundings of Tehsil Paharpur district D.I. Khan, Khyber Pakhtunkhwa. The data related to overall prevalence of sub-clinical mastitis in buffaloes are presented in Table 1. Milk samples were collected from apparently mastitis free 2000 quarters of 500 buffaloes. The samples were subjected to California Mastitis Test (CMT). The overall prevalence was 27.6%. In present study, the overall prevalence of SCM was lower. This observation is in agreement with the findings of Swami et al. Similarly, Khan and Muhammad conducted study on dairy buffaloes to identify prevalence of sub-clinical mastitis and found related results (Table 1) [11,12].

Animal Specie	Total no. of Animals tested	No. of animals Positive for SCM	Prevalence percentage of SCM animals	No. of animals without SCM	Percentage of animals without SCM
Buffalo	500	138	27.6	362	72.4

Table 1: The overall prevalence of sub-clinical mastitis in lactating Buffaloes.

Quarter wise prevalence of sub-clinical mastitis in Buffaloes

In present study, quarter wise milk samples from buffaloes were collected and screened against sub-clinical mastitis. The data presented in Table 2 shows that total numbers of quarters affected with sub-clinical mastitis were 291 out of total 2000 in buffaloes. Among these, 54(18.55%) were right fore, 84(28.86%) right hind, 51(17.52%) left fore and 102(35%) left hind quarters. The incidences were higher in hindquarters than forequarters and among hindquarters, left hindquarters were found to be

more susceptible. Among forequarters, right forequarters were found to be more susceptible. Swami et al. 2017, reported similar results. They collected quarter wise milk samples from buffaloes and screened against SCM and reported that out of 240 quarters of buffaloes, 35 quarters (14.58 %) showed positive reaction tested by Modified California Mastitis Test. Out of 35 quarters, 7 (20.00%) right fore, 11 (31.42 %) right hind, 7 (20.00%) left fore and 10 (28.57 %) left hind quarters were found positive for sub-clinical mastitis. Thus, the incidences were found higher in hindquarters and right hind quarters were found to be more susceptible. In case of forequarters, there were

higher incidences in right forequarters. Saini et al. (1994) also reported similar results (Table 2) [13].

Specie	No. of animal		Quarter					
	Tested	Positive	Tested	Positive	RF	RH	LF	LH
Buffalo	500	138	2000	291	54	84	51	102
Percentage		27.6		14.55	18.55%	28.86%	17.52%	35%

Table 2: Quarter wise prevalence of SCM in dairy animal.

Association between some risk factors with occurrence of sub-clinical mastitis in buffaloes

In present study, the various risk factors and their effect on prevalence of sub-clinical mastitis in buffaloes presented in table no.3. The prevalence of sub-clinical mastitis was found higher in the adult age group of buffaloes *i.e.* 35.38% than young age buffaloes *i.e.* 14.86%. Higher prevalence was observed in 7-9 lactation number i.e. 49.25% followed by 4-6 lactation number *i.e.* 28.52%. Higher prevalence was observed in the late lactation stage *i.e.* 31.69% than early lactation stage *i.e.* 29.34% respectively. The sub-clinical mastitis was found more in the knuckling method of milking 31.19% followed by the full hand *i.e.* 17.70%. The nature of housing had higher prevalence in kutcha type 31.69% and 26.18% in puccka type was seen. The result of statistical analysis revealed that no significant difference observed in infection amongst the stage of lactation, housing of the animal and lactation number. Age groups and method of milking were found statistically significant (P<0.05). Similar results were also found by Swami et al. 2017 [13].

Risk Factors		Total	SCM	Prevalence	X^2	P
			Affected	(Per cent)		Value
Age	Young	175	26	14.86		
					3.16	3.85
	Adult	325	115	35.38		
Lactation nos.	3-Jan	142	25	17.33		
	6-Apr	291	83	28.52	2.79	5.98
	9-Jul	67	33	49.25		
Stage of lactation	Early	167	49	29.34		
	Mid	150	32	21.33	0.48	5.98
	Late	183	58	31.69		
Housing	Knuckling	404	126	31.19		
					3.69	5.99
	Full Hand	96	17	17.7		
Milking method	Puccka	317	83	26.18		
					0.18	3.83
	Kutcha	183	58	31.69		

Table 3: Association between some of the risk factors with occurrence of subclinical mastitis. (Young: <6 years, adult: ≥ 6 years. Early lactation stage: 1 days to 120 days, mid lactation stage: 120 days to 240 days, late lactation stage: >240 days of lactation).

Conclusion

- It is concluded from the present study that the prevalence of sub-clinical mastitis in buffaloes was found 27.6 per cent.

- It was observed that prevalence of sub-clinical mastitis was found more in hind quarters than the fore quarters.

- Age of animal, number of lactation, stage of lactation, milking method and housing was major risk factors causing incidence of sub-clinical mastitis.

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