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Prevalence of Mastitis and its Correlation with Brucellosis among Bovine

Jafar khan[1], Mujeeb ur Rehman[1], Aziz ur Rehman Safi[1], Zia ur Rehman[1]and Imtiaz Ali Shah[2]

[1]Department of Microbiology, Kohat University of Science and Technology, Khyber Pakhtunkhwa, Pakistan
[2]Veterinary Research Institute, Peshawar, Pakistan

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Abstract: Mastitis is the inflammation of mammary glands of the dairy animals and tends to be a serious problem in the world while brucellosis is an important zoonotic disease caused by bacteria of the genus Brucella, found globally and is transmitted directly or indirectly through contact with infected secretions, milk and body fluids. Milk when contaminated by brucellae presents a high threat to the new born calves and also to the human as it can spread through ingestion and cause undulant fever or abortion. The current study was conducted to determine the prevalence of mastitis, and its correlation with brucellosis in bovine. A total of 196 milk samples were collected randomly and the overall incidence of mastitis was 25.5% by Surf Field Mastitis Test (SFMT) and brucellosis 6.1% by a routine Milk Ring Test (MRT). The results showed significant co-relationship between brucellosis and mastitis positive samples in accordance to the point prevalence analysis.

Key words: Mastitis, Brucellosis, Bovine

Introduction

Milk is the most important food product but it also acts as a good culture media for the growth and manipulation of various types of microorganisms due to its complex biochemical composition (Dogan et al., 2006). The presence of drug resistant pathogen in milk therefore poses serious health threat to the humans (Bradley, 2002). Milk may be contaminated from different sources such as infected cows, surrounding environment, and storage in contaminated utensils or contaminated water supply (Bonfoh et al., 2003).

Mastitis is a disease of all milking animals and is characterized by changes in udder tissue, clots in milk and alteration in composition and constitution of cattle milk (Schalm et al., 1971). It has been recognized as one of the most expensive diseases affecting dairy animal's worldwide

*Correspondence to: Jafar khan, Department of Microbiology, Kohat University of Science and Technology, Khyber Pakhtunkhwa, Pakistan, E-mail; jafarkhan1@yahoo.com

(Kossaibati et al., 1998). It has adverse effects on milk production by reducing the quantity approximately 21% and quality of butter fat by 25% (Degraves et al., 1993). Per-acute clinical mastitis has also been recognized as a cause of mortality in adult dairy cows (Menzies et al., 1995). *Staphylococci* are the mostly isolated bacteria in the subclinical condition of the disease (Watts, 1988). Generally mastitis can be diagnosed by Surf Field Mastitis Test (SFMT) and California mastitis test (CMT). Similarly brucellae contamination of milk can also be determined by Milk Ring Test (MRT) (Alto et al., 1988).

Brucellosis is a bacterial zoonotic disease affecting both human and animals. In animals, it causes abortion while in human it causes fever called Malta fever or undulating fever (Acha et al., 2003). Brucellosis causes both acute and persistent infection and mostly affects sex organs, less survival of new born and decreased milk production while mortality rate in adults is relatively insignificant (Sewel et al., 1990). The symptoms in human comprise anorexia, lethargy, headache, hepatomegaly, splenomegaly, night sweats, chills, arthralgia and myalgia along with undulant fever (Hugh-Jones, 2000).

Mastitis is the most important disease of dairy industry in developing countries (Allore et al., 1998). It causes great economical loss and the worldwide cost of this disease is US $ 35 billion annually (Blosser, 1979). The incidence rate of mastitis in Pakistan has been reported as 20-60% in cattle and buffaloes (Chishty et al., 2007). *Staphylococcus aureus*, *Streptococcus agalactae* and *Escherichia coli* are the main etiological agents of 78% cases of mastitis in Pakistan (Razzaq, 1998). The exact prevalence of the brucellosis in bovine is unknown in the country but has been reported to vary from 3.25% to 4.4% in different areas (Naeem et al., 1990). In dairy animals major economic losses due to brucellosis include loss of calves and reduced milk yield in females and infertility in males (Saeed et al., 1968). A high prevalence of brucellosis is reported in Faisalabad, area of Pakistan as 10.18% and among cattle by RBPT and ELISA tests it is around 8% (Iftikhar et al., 2008).

Materials and Methods

The study was carried out in ten union councils of Mardan District of Khyber Pakhtukhwa. A total of 196 milk samples were collected randomly of which 159 samples were from cows and 37 samples were from buffaloes of various dairy farms and households in the area. For selection of the origin of samples; i.e. the buffaloes and cows were suffering from clinical, sub clinical mastitis and brucellosis. These samples were brought in labeled sterile tight capped bottles for analysis in the Veterinary Research Institute Peshawar, KPK.

Before the test, each sample was mixed and shacked thoroughly. Known controls were used along each test. The samples were stored at 4-8C^0 and then were subjected to surf field mastitis test (SFMT) and milk ring test (MRT) for analysis.

Surf Field Mastitis Test (SFMT)

Surf field mastitis test (SFMT) is a conventional diagnostic test used for the detection of subclinical mastitis in cows and buffaloes. All the samples were subjected to surf test. For this purpose, 3% Surf solution was prepared by addition of three grams of commonly used detergent powder (Surf Excel, Unilever, Pakistan) in 100 ml of water. Milk samples and surf solution were then mixed in equal quantities in Petri dishes. The formation of gel depicted the positive samples (Muhammad et al., 1995).

Milk Ring Test (MRT)

Milk ring test (MRT) is commonly performed for identification of infected

cows. The test is the most practical method for locating infected dairy animals and for surveillance of brucellosis-free herds. The test was performed by adding 30 µl (0.03 ml) of *B. abortus* hematoxylin-stained antigen manufactured by the State Biological Laboratory, Institute of Veterinary Preventive Medicine, Ranipet, India. The height of the milk column in the tube was kept up to 25 mm. The milk (antigen) mixtures were incubated at 37°C for 1 h, together with positive and negative control samples. Agglutinated *Brucella*e were picked up by fat globules as they rose, forming a dark cream layer on the top of the sample. A strongly positive reaction was indicated by formation of a dark blue ring above a white milk column. The test was considered negative if the color of the under lying milk exceeded that of the cream layer and when the cream layer was normal (Mohamand et al., 2014).

Results

All 196 clinical and sub clinical samples from cows and buffaloes were processed by Surf Field Test and Milk Ring Tests.

Surf Field Mastitis Test (SFMT)

Among 196 clinical and sub clinical samples, the overall 50(25.5%) samples were positive for mastitis by SFMT. Among these, 37(18.87%) samples were from buffaloes of which 9(24.32%) were positive for mastitis and remaining 159(81.12%) cow samples, the 41 (25.78%) were positive by SFMT. The positivity was observed by the formation of gel due to the chemical reaction between an ionic detergent and somatic cells.

Milk Ring Test (MRT)

Milk ring test is a routine determinative test for brucellosis. The overall positive milk samples by MRT for brucellosis were 12(6.12%). It was observed that 12(7.54%) samples of 159(81.12%) cows were positive by MRT while no buffaloes sample was found positive to brucellae infection (Table 1).

Age wise Ratio of mastitis and brucellosis in bovine

Age wise all samples were divided into 3-groups; i.e. 1-5 years (38 samples), 6 (15.78%) samples were positive by SMFT and 3(7.89%) were positive by MRT. Among 6-10 years (148 samples), 38(25.67%) were positive by SFMT and 7(4.72%) were found positive by MRT. In the age group of 11-15 years (10 samples), 5(50%) were positive by SFMT to mastitis and 2(20%) samples were positive by MRT to brucellosis (Table.2).

The overall incidence of mastitis was 25.5% by SFMT and brucellosis 6.1% by MRT. The ratio of mastitis and *brucellae* infection positive cases was 33% to *brucellae* positive and mastitis negative 58% (Figs. 1, 2 and 3).

Age wise, group 3 (11-15 years) showed the highest incidence to both mastitis and brucellosis as compared to group 2 (6-10 years) and group 1 (1-5 years) which were with lesser prevalence respectively (Figure 4).

Table.1. Ratio of Mastitis and Brucellosis in bovine

Sample type	No. of samples	Positive to SFMT	Negative to SFMT	Positive to MRT	Negative to MRT
Cows	159(81.12%)	41(25.7%)	118(74.21%)	12(7.54%)	147(92.45%)
Buffaloes	37(18.87%)	9(24.32%)	28(75.67%)	0(0%)	37(100%)

Table 2. Age wise ratio of mastitis and brucellosis in bovine

Group of animals	No. of animals	SFMT positive	MRT positive
1-5 years	38	6(15.78%)	3(7.89%)
6-10 years	148	38(25.67%)	7(4.72%)
11-15 years	10	5(50%)	2(20%)

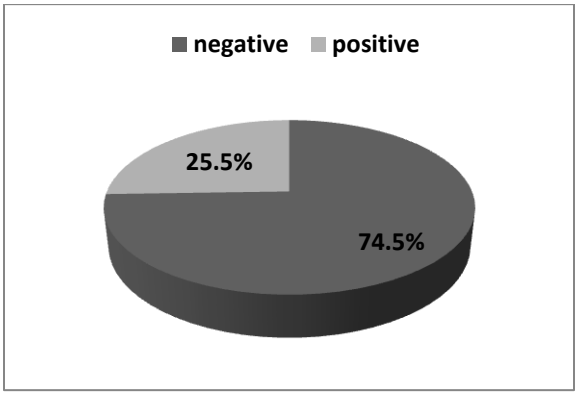

Figure 1. The overall incidence of Mastitis in bovine

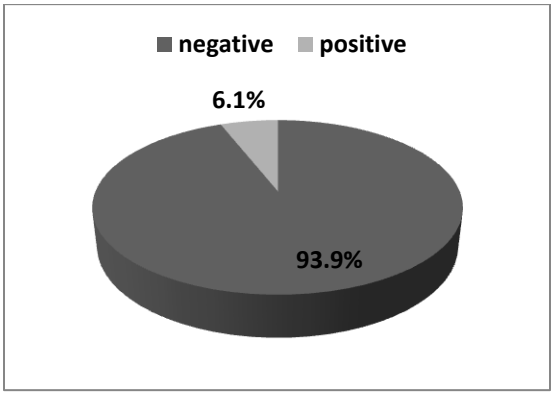

Figure 2. The overall incidence of Brucellosis in bovine

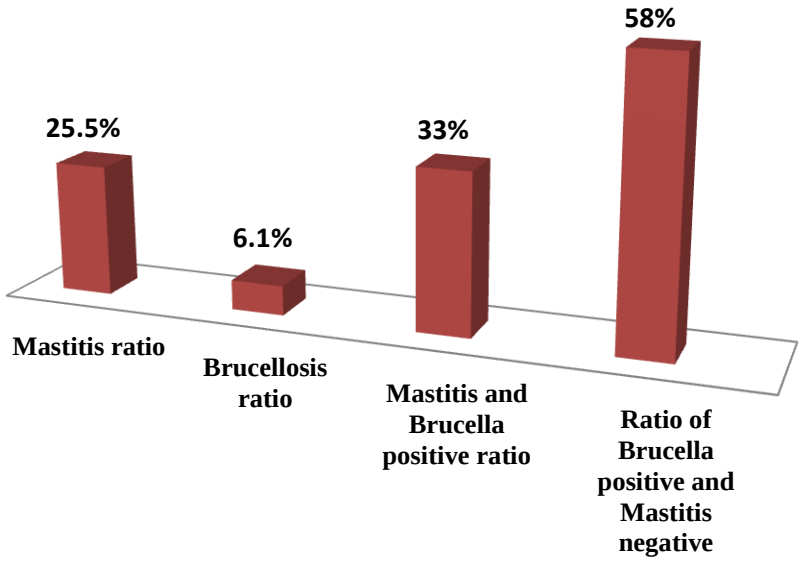

Figure 3. Overall results of Mastitis, brucellosis and its co-relation in bovine

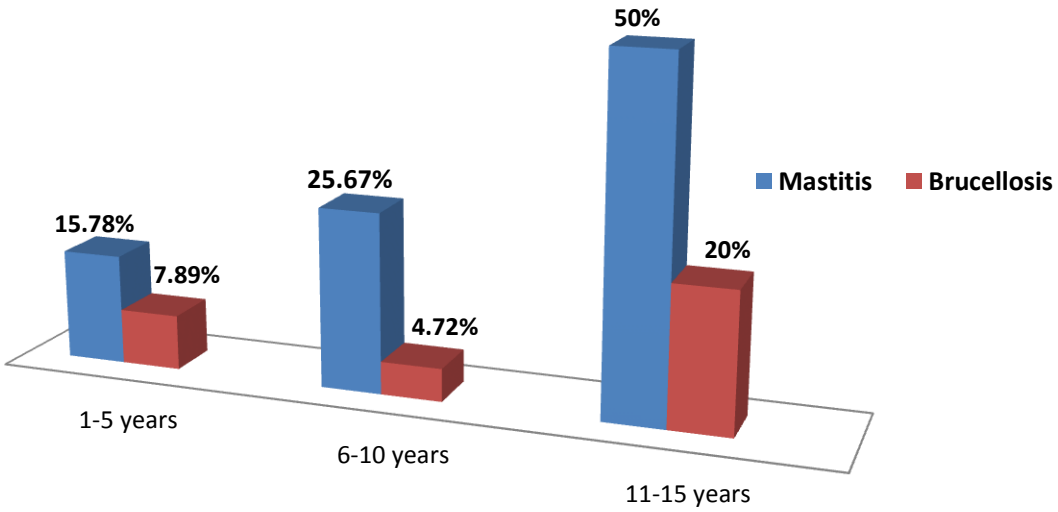

Figure 4. Age wise ratio of Mastitis and Brucellosis in bovine.

Discussion

Milk is one of the most important natural food throughout the world. Due to its complex biochemical composition and rich water abundance, it also serves as a good culture medium for a wide variety of microorganism. Milk can be contaminated with pathogens from different sources, i.e. from infected cattle, from surrounding environment, storage in contaminated utensils or due to contaminated water supply.

Mastitis is the inflammation of mammary glands in dairy animals where as brucellosis is a widespread and economically important infectious disease of animals and humans caused by members of the genus *Brucella*.

In this study, we tried to find the overall incidence of mastitis and its correlation with brucellosis in bovine in the mentioned region. The overall incidences of mastitis and brucellosis were 50(25.5%) and 12(7.54%) among 196 samples respectively. Similar study was conducted in Burewala, Pakistan in which the clinical and sub clinical mastitis (SCM) were found in cattle with percentage incidence of 18.21% and in buffalos 24.60% respectively (Hameed et al., 2012). These findings are aligned with the outcome of 59% among cows and 41% in buffalos respectively (Bilal et al., 2004; Nooruddin et al., 1997).

In Iran, a similar study was carried out in which 338 milk samples were collected from 36 villages in the two seasons of spring and autumn in 2008. On Milk Ring Test (MRT), 82 milk samples collected in spring, 1 (1.22%) showed positive results and others (98.78%) showed negative reaction. From 256 milk samples collected in autumn, 3 (1.17%) showed positive and 253(98.83%) showed negative results. However these observations showed that prevalence of brucellosis in cattle was low in that region (Maadi et al., 2011).

In present study the MRT and SFMT were performed for all the samples and it is concluded that mastitis is one of the most important disease of dairy cattle; its severity may lead to zoonotic disease like brucellosis. This is important for human health as well as on economic point of view. It is suggested that by providing hygienic environment to cattle and by adapting appropriate milking conditions, the risk of infection could be reduced.

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