



RESEARCH PAPER

OPEN ACCESS

Prevalence and epidemiological parameters of bovine tuberculosis in cattle and buffaloes in district Peshawar, Pakistan

Shah Nawaz¹, Muhammad Subhan Qureshi¹, Fida Muhammad Khan^{*2}, Ziaul Islam³

¹*Faculty of Animal Husbandry and Veterinary Science, The University of Agriculture, Peshawar, Pakistan.*

²*Directorate of Livestock and Dairy Development Department (Extension Wing), Peshawar, Pakistan*

³*Department of Animal Sciences, Faculty of Sciences, Shaheed Benazir Bhutto University Sheringal Dir Upper, KPK, Pakistan*

Key words: Prevalence, Bovine, Tuberculosis, Cattle, Buffaloes, Peshawar

<http://dx.doi.org/10.12692/ijb/10.4.263-267>

Article published on April 30, 2017

Abstract

A cross sectional study was carried out to find the prevalence of bovine tuberculosis and its various epidemiological parameters in cattle and buffaloes in District Peshawar. A total of 276 animals i.e. 144 cattle and 132 buffaloes were screened in 45 dairy farms, 2 abattoirs and one animal market. The overall prevalence of bovine tuberculosis was founded 7.97% in both cattle and buffaloes while, individually 6.94% and 9.09% prevalence was observed in cattle and buffaloes, respectively. Among the epidemiological parameters, significant relation was founded in age ($P=0.040$) and BCS ($P=0.001$), while no significant relation was founded between, specie, sex and pregnancy status of animal with bovine tuberculosis. Specie wise more prevalence was founded in buffaloes (6.94%) as compared to cattle (9.09%). Age wise, 15.78% and 17.77% prevalence was recorded in cattle and buffaloes having age >7 years, respectively. Similarly more prevalence 16.12% and 18.03% was recorded in cattle and buffaloes having BCS<2.25, respectively. As it was the first study conducted in the District Peshawar, it was concluded that bovine tuberculosis is endemic in cattle and buffaloes in the study area. The results indicate that further epidemiological and molecular studies are required to control and eradicate this zoonotic disease to reduce threat to other healthy animals as well as to human population associated with livestock.

* **Corresponding Author:** Fida Muhammad Khan ✉ fidakhan28@gmail.com

Introduction

Bovine tuberculosis (TB) is a zoonotic disease of cattle and buffaloes as well as human beings, which is caused by a bacterium called *Mycobacterium bovis* (*M. Bovis*). Bovine tuberculosis also occurs in pets animals like dogs, cats, and some domesticated animals like sheep, goats, horses and pigs. Transmission of bovine tuberculosis occurs mainly through aerosol within and between various species of animals and human. Individual may also be infected through ingestion of bacteria in milk or through contact with already contaminated utensils.

Currently the field diagnosis of *M. Bovis* is totally based on tuberculin test that comprises immune response to *M. bovis*. However, tuberculin test specificity is ranged from 96-99 percent, but low specificity was also reported in some areas of the world due to cross reactivity with other mycobacterial species. For the detection of blood antibodies of mycobacteria various serological assays has been persistently carried out, but no test gives the satisfactory results to make them as a diagnostic tool (Monaghan *et al.*, 1994).

In Pakistan 30.8 million and 34.3 million buffaloes and cattle are found, respectively. In the farm animals various pathogens are prevailed in which mycobacterium has the vital significance. The estimated production loss due to tuberculosis in animals is 10 to 25% without counting mortality. Although bovine tuberculosis is significant hazard for animal production but also play a major role in human causing more public health hazard and deaths than HIV and malaria throughout the world.

Socio-economically this disease is very important disease which also has keen importance on public health point of view and great importance to worldwide livestock and their products i.e. milk and meat trade (Cousins, 2001).

It is also important for our country because the situation of bovine tuberculosis in Pakistan is endemic in domesticated, wild animals and humans (Jalil *et al.*, 2003).

The present study was conducted to find out the prevalence and epidemiological parameters of bovine tuberculosis in cattle, buffaloes in order to know the magnitude of threat of Bovine TB from animals to human population in the region.

Materials and methods

Study area

The present study was conducted in district Peshawar Khyber Pakhtunkhwa. Forty Five different farms, two abattoirs and one animal market were selected. The farm selected for the screening of animals comprises of small house hold, medium size, urban and per urban commercial and Government dairy farms.

Study population

In cattle and buffaloes both sex, male and female were selected. Both cattle and buffaloes were categorized into three different age groups (1-4 years, 4-7 years, >7 years), similarly cattle and buffaloes were categorized on the basis of BCS (week <2.5, moderate 2.5-3.5, fat >3.5) and pregnancy status i.e. pregnant and non-pregnant animals.

Sample size

A total of 246 samples were assumed by expecting 20% prevalence of bovine tuberculosis according to the formula by Thru field (2005). To increase the precision 276 animals were screened in which 132 were buffaloes and 144 were cattle.

Single side intradermal tuberculin test (SSIDT)

A total of 144 cattle and 132 buffaloes were screened randomly through SIDT. Specified area at the mid neck of the animals was selected; the area was clipped and marked by a permanent marker. The thickness of the skin fold was measured by using vernier caliper in millimeters. The initial skin thickness was observed and recorded. After antiseptic application a small dose of bovine tuberculin (bovine purified protein derivatives, PPD) 0.2 ml was injected intra-dermally in the middle of the marked area and the subsequent detection of swelling (delayed hypersensitivity) at the site of injection were observed after 72 hours by using vernier caliper. A 4 mm or more increase in the skin thickness was considered as positive for tuberculosis (OIE Manual, 2009).

Data Analysis

The prevalence rate was calculated by dividing positive animal by total number of animals. The risk factors were analyzed by descriptive analysis through cross tabulation by chi square test using SPSS 16.

Results

Specie-wise prevalence

In the present study, out of 276 animals, 22 animals were found positive for bovine tuberculosis and showed 7.97% overall prevalence. In buffaloes highest incidence 9.09% was recorded while in cattle 6.94% prevalence was recorded 9.09%. The incidence of disease among the species was non-significant having P-value 0.511 as shown in table.

Sex-wise prevalence

Sex-wise highest prevalence was recorded in female as compared to male both in cattle and buffaloes. In cattle, 5% and 7.5% prevalence was recorded in males and females, respectively while in buffaloes it was 5.88% and 9.56% in male and female respectively. The prevalence among the both sex was non-significant having P-value 0.536 as shown in table.

Age-wise prevalence

Age wise the disease was more common in highest age groups i.e. 15.78% in cattle and 17.77% in buffaloes, respectively.

In middle age groups the prevalence was recorded 7.25% in cattle and 9.56% in buffaloes while in lowest

age groups the incidence was 2.2% in cattle and 4.91% in buffaloes. Age-wise prevalence difference in 3 categories was significant having P-value 0.001 as shown in table.

Prevalence according to BCS

In both species the prevalence was highest in those animals having BCS<2.25 and it was recorded 18.03%. Both in cattle and buffaloes having BCS<2.25, prevalence was recorded 16.12% and 20%, respectively. The cattle having BCS=2.25, the prevalence was recorded 6.6% while, in buffaloes it was recorded 6%. In cattle having BCS>2.25, the prevalence was 2% while in buffaloes the prevalence was 3.84%. The P-value (0.001) indicates that the incidence is significantly high in those animals having BCS<2.25 as shown in table

Prevalence according to pregnancy status

The incidence of the disease in pregnant and non-pregnant cattle was recorded 9.25% and 5.71% respectively, while in buffaloes it was 11.32% and 8.06% in pregnant and non-pregnant respectively. In both species i.e. cattle and buffaloes, 10.28% prevalence was recorded in pregnant animals while, 6.18% prevalence was recorded in non-pregnant animals. The occurrence of the disease among pregnant and non-pregnant animals was non-significant having the P-value 0.397 as shown in table.

Table. Prevalence of bovine tuberculosis in cattle and buffaloes according to sex, age, BCS and pregnancy status.

S. No	Specie	Parameters	Total sample	Positive sample	Percentage (%)	P -value
Prevalence according to Specie in cattle and buffaloes						
1		Cattle	144	10	6.94	0.511
		Buffalo	132	12	9.09	
		Total	276	22	7.97	
Prevalence according to Sex in cattle and buffaloes						
2	Cattle	Male	20	1	5	0.712
		Female	124	9	7.25	
	Buffaloes	Male	17	1	5.88	0.622
		Female	115	11	9.56	
	Total	Male	37	2	5.4	0.536
		Female	239	20	8.36	
Prevalence according to Age groups in cattle and buffaloes						
3	Cattle	1 to 4	45	1	2.2	0.038
		4 to 7	61	3	4.91	
		>7	38	6	15.78	
	Buffaloes	1 to 4	32	1	3.12	0.041
		4 to 7	55	3	5.45	
		>7	45	8	17.77	
	Total	1 to 4	77	2	2.59	0.001

S. No	Specie	Parameters	Total sample	Positive sample	Percentage (%)	P –value
		4 to 7	116	6	5.57	
		>7	83	14	16.68	
Prevalence according to BCS in cattle and buffaloes						
4	Cattle	>2.25	31	5	16.12	0.046
		2.5to3.5	60	4	6.66	
		>3.5	53	1	1.88	
	Buffaloes	>2.25	30	6	2	0.029
		2.5to3.5	50	3	6	
		>3.5	52	2	3.84	
	Total	>2.25	61	11	18.03	0.001
		2.5to3.5	110	7	6.36	
		>3.5	105	3	2.85	
	Prevalence according to pregnancy in cattle and buffaloes					
5	Cattle	Pregnant	54	5	9.25	0.34
		Non Pregnant	70	4	5.71	
	Buffaloes	Pregnant	53	5	9.43	0.610
		Non Pregnant	62	6	9.67	
	Total	Pregnant	107	10	9.34	0.397
		Non Pregnant	132	10	7.57	

Discussion

In country like Pakistan, several zoonotic diseases are prevailing, in which bovine tuberculosis has the chief importance. In Pakistan, bovine tuberculosis is increasing with the passage of time (Javeed *et al.*, 2006). As Pakistan ranks 8th position in the world in those countries which have the peak prevalence of tuberculosis. Prevalence of this zoonotic disease in Pakistan is endemic in human as well as in livestock and wild animals (Jalil *et al.*, 2003).

The results of this study were in favor to a study which founded that tuberculosis is 6.91% in buffaloes and 8.64% in cows (Sulieman *et al.*, 2002). The findings of this research were also in conformity with the study which reported that the incidence of bovine tuberculosis in buffaloes varies from 0.3% to 20.2% in different area of various countries (Khan and Khan, 2007; Rodwell *et al.*, 2001). The prevalence of bovine tuberculosis was recorded 10.06% in buffaloes with significant association with high milk production and age factor (Imtiaz *et al.*, 2008).

Older animals have more chances to get infection. In higher ages, the animals may be in productive and reproductive stress and immune status of animals might become weaker which play a vital role in getting infection (Kazwala *et al.*, (2001); Amin *et al.*, 1992). In older age the animals become exposed to various other disease and contact with other animals and farms increases, which play a major role in getting infection.

The incidence of bovine tuberculosis is high in older age of animals. The incidence of disease might be high in younger stock, if they are feed on the dam milk and the risk of disease is high in dams than the young stock. Although, still the occurrence of disease in younger stock is very less (Cagiola *et al.*, 2004; Rodwell *et al.*, 2000). Highest positive reactors of *M. Bovis* in animals having age more than 6 years was significantly correlated with BCS, which showed highest proportion of *M. bovis* prevalence in animals having BCS<2.25 (Javeed *et al.*, 2006).

In pregnant animals disease prevails more, it may be due to high production and pregnancy stress which leads to low immune status. The incidence of disease in male was recorded comparatively less as compare to females it might be due to the factor that male animals are reared in younger age groups and female have more stress full conditions of reproduction and high milk yield. Bovine tuberculosis was found mainly in those animals heaving low BCS. The high prevalence in this group is due to emaciated condition of body and low immunity (Imtiaz *et al.*, 2008).

As it was the first study conducted in the District Peshawar, the results of the present study concluded that the bovine tuberculosis is endemic both in cattle and buffaloes in District Peshawar. Old age animals with weak and emeciated body condition favour the propagation of this desease in animals.

As it is a zoonotic disease, further epidemiological and molecular studies are suggested to control and eradicate this zoonotic disease both in animals as well as in human population to ensure public health safety and security.

References

- Amin S, Khan MA, Hashmi HA, Khan MS, Ahmad I, Bhatti MA.** 1992. Detection of buffalo tuberculosis by using short thermal test and isolation of causal organisms from lymph nodes. *Buffalo Journal* **8**, 83-87.
- Cagiola M, Feliziani F, Severi G, Pasquali P, Rutili D.** 2004. Analysis of possible factors affecting the specificity of the gamma-interferon test in tuberculosis-free cattle herds. *Clinical and Vaccine Immunology* **11**, 952-956.
- Cousins DV.** 2001. *M. bovis* infection and control in domestic livestock. *Revue Scientifique et Technique* **20**, 71-85.
- Imtiaz A, Khan A, Khan A, Mubarak, Ali S.** 2008. Factors Affecting Prevalence of Bovine Tuberculosis In Neeli Ravi Buffalos. *Pakistan Veterinary Journal* **28**, 155-158.
- Jalil H, Das P, Suleman A.** 2003. Bovine tuberculosis in dairy animals at Lahore: threat to the public health. Metropolitan Corporation Lahore, Pakistan.
- Javed MT, Usman M, IrfanM, Caiola M.** 2006. A study on tuberculosis in buffaloes: some epidemiological aspects, along with hematological and serum protein changes. *Veterinarski Arhiv* **76**, 193-206.
- Kazwala RR, Kambarage DM, Daborn CJ, Nyange J, Jiwa SFH, Sharp JM.** 2001. Risk factors associated with the occurrence of bovine tuberculosis in cattle in the Southern Highlands of Tanzania. *Veterinary Research Communication* **25**, 609-614.
- Khan IA, Khan A.** 2007. Prevalence and risk factors of bovine tuberculosis in Nili-Ravi buffaloes in the Punjab, Pakistan. *Italian Journal of Animal Science* **6**, 817- 820.
- Monaghan ML, Doherty ML, Collins JD, Kazada JF, Quinn PJ.** 1994. The tuberculin test. *Veterinary Microbiology* **40**, 111-24.
- OIE terrestrial manual** 2009. Version adopted by the World Assembly of Delegates of the OIE.
- Rodwell TC, WhyteI J, Boyce WM.** 2001. Evaluation of population effect of bovine tuberculosis in free-ranging African buffalo (*Syncerus cafer*). *Journal of Mamma logy* **82**, 231-238.
- Sulieman MS, Hamid ME.** 2002. Identification of Acid Fast Bacteria From Caseous Lesions in Cattle in Sudan. *Zoonoses and public health* **49**, 415-418.
- Thrusfield M.** 1995. *Veterinary Epidemiology* 2ed edition. UK: Back well scientific Ltd 182-198.