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EPIDEMIOLOGICAL STUDIES ON TUBERCULOSIS IN BUFFALO POPULATION IN VILLAGES AROUND FAISALABAD

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ABSTRACT

Faisalabad is the third largest city of Pakistan with an approximate population of 2.6 million. Most of the raw milk supplied in the city for consumption of the people comes from peri-urban areas of the city. Bovine tuberculosis (TB) is one of the most important zoonotic diseases transmitted through milk. Disease has also economic importance due to decrease in milk production of affected animals. The present study was conducted to measure the prevalence and some associated factors of bovine TB in buffaloes in peri-urban areas of Faisalabad city. A total of 1052 buffaloes were selected through cluster random sampling considering every dairy herd as a cluster in the villages within 15 kilometer radius from Clock Tower of Faisalabad City from year 2005 to 2008. Number of animals selected during the years 2005, 2006, 2007 and 2008 were 263, 259,264 and 266 respectively. The epidemiological data were collected on factors like age, sex, physical condition, milk yield and housing of the animals on pre-designed data capture forms. All the animals were tested for TB through single intra-dermal comparative tuberculin test (SICTT). The prevalence of TB in buffaloes was recorded as 2.47 %. The temporal distribution over a period of years revealed that the disease is endemic in buffalo population in peri-urban areas of Faisalabad city with prevalence of 2.26 to 2.70 %. Age, physical condition, milk yield and housing of the animals were found associated with the disease through chi-square test while sex of the animal did not show any association with the disease. The animals of 5-8 years of age were at highest risk of disease with prevalence of 4.04 to 5.04 %. No animal up to one year age was found positive. The animals with poor physical conditions (5.05) had 2.8 times higher prevalence than the animals with good health conditions (1.80). When association between milk yield and the disease was investigated, the buffaloes with highest prevalence (6.57%) of disease had daily milk yield of 4-6 liters. No reactor belonged to the group having milk yield of 10-12 liters. The animals maintained under closed housing had significantly higher prevalence (3.57) than the animals kept under open housing conditions (1.35%). It is suggested that all the dairy animals in the peri-urban areas of Faisalabad city should be tested regularly for prevalence of bovine TB by Department of Animal Health/Public Health Department. The animals found positive should be removed from the dairy population through appropriate compensation to the dairy farmers for safety of the human health and reduce the milk losses caused by the disease. The raw milk should never be consumed by the people in any way.

Key words:

INTRODUCTION

Tuberculosis (TB) is an important disease caused by the members of the *Mycobacterium* family that mainly affects the respiratory system. Three main types of TB and their causative agents are human TB caused by *Mycobacterium tuberculosis*, avian TB caused by *M. avium* and bovine TB caused by *M. bovis*. Human TB is rarely transferable to non-human species. Avian TB is typically restricted to birds. Bovine or cattle TB, presently known as zoonotic TB, is a highly infectious disease, infecting most of the warm-blooded animals including man. Bovine TB is present in animals in most of the developing countries where surveillance and control activities are often inadequate or unavailable (Cosivi *et al.,* 1995). The high infectivity of pulmonary tuberculosis and the extent of disease in cows have caused this to be one of the most common and lethal infectious disease throughout the world (Anderson, 1977). It is one of the wane all over the world (Thadepalli, 1980 and Collier *et al.,* 1998).

Bovine TB is also one of the major zoonotic diseases in Pakistan. Prevalence of bovine TB in buffaloes in the country has been reported from 0.51% to 12.72 % (Barya, 1969; Khilji, 1974; Amin, 1989; Akhter *et al*., 1992; Javed *et al*; 2006, Khan and Khan, 2007; and Khan *et. al*. 2008)). Traditionally raw milk is still consumed by some of the people in rural areas and is a potential source of human tuberculosis. Bovine TB due to *Mycobacterium bovis* is a major cause of human gastrointestinal tuberculosis in developing countries where bovine milk is often not pasteurized before use (Bonsu, 2000). Animal reservoirs of *Mycobacterium bovis* pose a serious threat to human health. Tuberculosis in cattle principally involves the lungs and it spreads from animal to animal by cough spray. Human in direct contact with cattle might be infected and develop primary

pulmonary lesions. Milk is the principle vector of transmission of *M. bovis* to human. Such transmission is facilitated by the pooling of milk from many cows and herds (Collier *et al*., 1998).

The endemicity of tuberculosis in bovine population and the potential health hazard has emphasized the need of continuing efforts to understand the epidemiology of the disease (Theon *et al.,* 1979). It may cause as high as 25% TB in human (Heaf, 1957). Moreover, infected animals loose 10-25% of their production efficiency (Hussain and Rabbani, 2000). Diagnosis of the disease is very important to control the disease. It is possible by demonstrating the tubercle bacilli, the primary cause of the disease directly in animal secretions by direct microscopy, culture or guinea pig inoculation. In practice, the most usual diagnostic tool for tuberculosis is tuberculin testing. This test is widely used and performed by an intradermal injection into the skin of neck or caudal fold and measurement of local increase in skin thickness three to five days later.

Faisalabad is the third largest city of Pakistan with an approximate population of 2.6 million. All the dairy animals of the city were moved to peri-urban areas of the city about 10 years before. Now most of the raw milk supplied in the city for consumption of the people comes from peri-urban areas of the city. Bovine tuberculosis (BTB) is one of the most important zoonotic diseases transmitted through milk. Disease has also economic importance due to decrease in milk production of affected animals. The present study was, therefore, conducted to measure the prevalence and some associated factors of BTB in buffaloes in peri-urban areas of Faisalabad city.

MATERIALS AND METHODS

Sampling Frame: Buffalo population within 12 kilometers from Clock Tower of Faisalabad city.

Sampling method, duration and size: A total of 1052 buffaloes were selected through cluster random sampling considering every dairy herd as a cluster in the villages within 12 kilometer radius from Clock Tower of Faisalabad City from year 2005 to 2008. Number of animals selected during the years 2005, 2006, 2007 and 2008 were 263, 259,264 and 266 respectively.

Data collection: The epidemiological data were collected on factors like age, sex, physical condition, milk yield and housing of the animals on pre-designed data capture forms.

Diagnosis of TB reactors: All the selected animals were tested through single intradermal comparative tuberculin test (SICTT). A volume of 0.1 ml each of mammalian and avian tuberculin was injected intradermally in the neck in the middle portion on the right side about 10-15 cm apart. The test was read 72 hours after inoculation (Chauhan, 1995; Grooms and Molesworth, 2000).

Analysis of data: The prevalence of bovine TB was calculated by the following formula:

$$\text{Prevalence (\%)} = \frac{\text{Number of animals +ive through tuberculin tests}}{\text{Total number of animals tested}}$$

The association if any between the factors and the disease was measured through Chi-square test.

(Thrusfield, 2008)

RESULTS AND DISCUSSION

Of the total 1052 buffaloes 26 were found positive through SICTT giving a prevalence of 2.47 % of bovine TB (Table 1). The prevalence of bovine TB in bufalloes was reported 6.72% by Barya (1969), 0.53 and 5.31 % by Khilji (1974), 7.3% by Amin (1989), 4.37% by Akhter *et al,* (1992), 1.7% by Ifrahim (2001), 5.48% by Javed *et al.,* (2006), 12.72% by Khan and Khan (2007) and 10.6% by Khan *et al*. (2008) in different parts of the country. The higher prevalence of disease reported by other workers is mostly at large livestock farms. The temporal pattern of the prevalence over a period of four years (2005-2008) indicates that bovine TB is endemic in the buffalo population in the area (Table 1). No data are available on prevalence of bovine TB in buffaloes in the country measured over a longer period. All the studies were conducted once in population at a point of time.

The animals of 5-8 years of age were at highest risk of disease with prevalence of 4.04 to 5.04 %. No animal up to one year age was found positive. After 8 years of age there was a decrease in the prevalence. The reason for low prevalence in the animals of 2-3 years of age might be the small duration of exposure to the organism excreted by reactors present in the population. The age of 5-8 years in dairy buffaloes is the peak production period and therefore animals may go under stress becoming more susceptible to the agent. Similar findings have been recorded by Qureshi *et al.* (1966) and Bonsu *et al.* (2000) who reported that adult females during lactation may suffer from nutritional deficiency that can act as predisposing factor for tuberculosis and may reduce immunity against the disease. The animals are sold to butchers and in the market (Mandies) because of low production as TB decreases milk production up to 25 % (Hussain and Rabbani, 2000). Javed *et al.,* (2006) and Khan *et al*. (2008) have also reported that the animals of higher age group were at higher risk of the disease.

Table 1: Prevalence of Tuberculosis in buffaloes in relation to various factors

Factor	No. of animals examined	No. of animals positive	Prevalence (%)
Time (Year) p>0.05			
2005	263	6	2.28
2006	259	7	2.70
2007	264	7	2.65
2008	266	6	2.26
Total	**1052**	**26**	**2.47**
Age (Years) p<0.05			
1	251	0	0.00
2	127	1	0.79
3	69	1	1.45
4	73	1	1.37
5	99	4	4.04
6	119	6	5.04
7	106	5	4.72
8	85	4	4.71
9	62	2	3.23
≥10	61	2	3..28
Total	**1052**	**26**	**2.47**
Sex p>0.05			
Male ≤2 years	130	1	0.77
Female ≤2 years	213	-	0.00
Male > 2 years	35	1	2.86
Female > 2 years	674	24	3.56
Total	**1052**	**26**	**2.47**
Physical Conditions p<0.05			
Good	834	15	1..80
Poor	218	11	5.05
Total	**1052**	**26**	**2.47**
Milk Yield (Liters) p<0.05			
1-3	117	3	2.56
4-6	213	14	6.57
7-9	159	2	1.26
10-12	95	-	0.00
Total	**584**	**20**	**3.42**
Type of Housing p<0.05			
Open	519	7	1.35
Close	533	19	3.57
Total	**1052**	**26**	**2.47**

The sex of the animal was not found associated with the disease in the present study (Table 1).The animals with poor physical conditions had 2.8 times higher prevalence (5.05%) than the animals with good physical conditions (1.80). It indicates that on one side disease affects the health status of the animal and on other side animals with poor health conditions are at higher risk of disease due to weak immune system of the body. Anonymous (1999) also stated that TB is chronic debilitating disease. Hussain and Rabbani (2000) reported that infected animals may loose 10-25% of their productive efficiency.

When association between milk yield/day and the disease was investigated, the buffaloes with highest prevalence (6.57%) of disease had daily milk yield of 4-6 liters followed by the groups of 1-3 liters (2.56%) and 7-9 liters (1.26 %). No reactor belonged to the group milk yield of 10-12 liters. The overall prevalence in the dairy buffaloes was recorded as 3.42%. Javed *et al.,* (2006) reported highest prevalence (9.43%) in animals with milk yield of 5.1 to 6 liters followed by the animals with milk yield of 6.1 to 7 liters (7.54%). The prevalence in the animals having less than 5 liters and more than 7.1 liters had prevalence of 5.66%. Khan *et al*. (2008) recorded highest prevalence (75%) in the animals with milk

production of more than 7 litters where as the prevalence in the animals with production up to 7 liters was recorded as 12.50 %. So the present findings are in accordance with the findings of Javed *et al.,* (2006) but differ with the results of *et al*. (2008).

The animals maintained under closed non-ventilated housing had significantly higher prevalence (3.57) than the animals kept under open housing conditions (1.35%). As the major route of transmission in TB is respiratory route so the reason for the higher prevalence under closed unventilated housing may be the higher number of the causative organism per unit area of the internal air of the house. According to Bahuchkin (1995) the poor maintenance was the actual cause of high TB morbidity. Colior *et al.,* (1998) stated that in the absence of specific control programs, the incidence of tuberculosis in the community was affected by many factors including the density of population, the extent of overcrowding and the general standard of living and health care.

It was also noted that the people in the study area have no awareness about the disease and most of the milkiers traditionally consume milk directly from the teat, although the milk is the important fomite of transmission of disease to human (Grange 1998). It is suggested that all the dairy animals in the peri-urban areas of Faisalabad city should be tested regularly for prevalence of bovine TB by Department of Animal Health/Public Health Department. The animals found positive should be removed from the dairy population through appropriate compensation to the dairy farmers. The raw milk should never be consumed by the people in any way.

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