

The role of bovine tuberculosis as zoonotic disease in Ethiopia

Daginet Yimenu¹, Amsalu Demissie²

Abstract

Bovine tuberculosis (BTB) is endemic in Ethiopia although the epidemiology and zoonotic importance of the disease is not well known. In order to assess the magnitude of BTB in animals and its zoonotic impact in humans a comprehensive surveillance study has to be conducted in all the geographical zones of the country. Tackling a disease like BTB which affects both livestock and humans requires joint activities between the ministries of Agriculture and Rural Health. The close working relationship developed between the Ministry of Agriculture and Rural Development (MoARD) and the Ministry of Health (MoH), such as the National Coordination Committee created for the avian human influenza and Rift Valley fever threat can be used for BTB as well. Through this development an effective response can be mounted against BTB and other serious livestock diseases that have a significant public health component. A joint effort of the two ministries as well as national and international research institutes is required more than ever to handle old and newly emerging zoonotic diseases. [*Ethiop.J.Health Dev.* 2008;22(Special Issue):126-127]

Introduction

Zoonoses are defined as those diseases and infections naturally transmitted between people and vertebrate animals. In most cases, animals play an essential role in maintaining the infection in nature and contribute in varying degrees to the distribution and actual transmission of infection in human and animal populations. These diseases have a variety of transmission mechanisms that may be direct such as in rabies and anthrax, or indirect, via vectors, food, water and the environment, as in the case of bovine tuberculosis and cysticercosis. Many, such as brucellosis, also have multiple routes of infection. With the constant and inevitable interaction of man and animals, zoonotic diseases remain a genuine threat to health and survival for people, their livestock, companion animals and wildlife.

The significance of zoonotic diseases is expanding and their health and socioeconomic impacts are increasingly being experienced by many countries, particularly the developing ones. In countries such as Ethiopia, the establishment and implementation of adequate measures for livestock and consumer health protection against zoonoses, especially those that are new and emerging, has proven to be very difficult. Thus zoonotic diseases continue to further burden public health systems as well as to undermine efforts to boost livestock production and exports.

Bovine tuberculosis

Bovine tuberculosis is a significant zoonosis that can spread to humans through aerosols and by ingestion of raw milk. In developed countries, eradication efforts have significantly reduced the prevalence of this disease, but reservoirs in wildlife make complete eradication difficult. Bovine tuberculosis is still common in developing countries, and economic losses can occur in cattle and buffalo from deaths, chronic disease, and trade restrictions. Infections may also be a serious threat to endangered species.

In Ethiopia bovine tuberculosis is endemic, although the epidemiology and zoonotic importance of the disease is not well known due to lack of nation-wide investigation. However, the disease has frequently been reported in Ethiopia from small scale studies, though the magnitude of the impact of BTB on animal health is largely unknown. Since the disease is known to affect a large host range (cattle, goat, sheep, camels, humans, and wildlife) it makes its assessment difficult.

Local and military pathological lesions are seen in abattoirs during meat inspection, and the disease has been described in cattle and in wildlife. Up to 50% of dairy farms in Addis Ababa were shown to be positive. *M. bovis* was also isolated from humans. A study conducted on 788 cattle subjected to a Single Intra-dermal Comparative Cervical Tuberculin (SICCT) showed a prevalence of 29% of which 188 (23.8%) were positive to bovine PPD, and 46 (5.8%) were doubtful reactors. There was a significant difference in prevalence between farms ranging from 4.2% to 90.8%, the highest being commercial dairy farms. Analysis of risk factors revealed that prevalence of BTB was significantly associated with management and breeds (1,2,3,4).

A total of 265 human sputum, bovine milk and tissue samples were cultured and 102 samples were positive for bacterial growth on primary culture. However, only 81 were positive for acid fast bacilli on subculture and subjected to niacin test: 36 (44.4%) were niacin positive indicating *M. tuberculosis*, and 45 (55.6%) negative indicating *M. bovis* or atypical mycobacterium. Niacin positive organisms were isolated from sputum and milk samples, suggesting the possibility that raw milk and its products act as a vehicle for the transmission of *M. tuberculosis* (1) from cattle to humans. Isolation of niacin negative organisms from human sputum is an indication of zoonotic importance of BTB.

Routes of transmission

Agents transmissible between livestock and humans (zoonotic agents) may have an important impact on the health status of livestock keepers because they live in close contact to their animals. A number of zoonoses are among the oldest known diseases and many are entrenched, particularly in rural agricultural communities. Increasingly they are also found in urban areas where people keep livestock and live in close contact with their animals.

Tuberculosis can be transmitted either by the respiratory route or ingestion. In cattle, aerosol spread is more common. Infectious bacteria can be shed in the respiratory secretions, feces, milk, and in some individuals in the urine, vaginal secretions, or semen. Not all infected animals transmit the disease; asymptomatic and anergic carriers occur. *M. bovis* can survive for several months in the environment, particularly in cold, dark, and moist conditions.

In Ethiopia, where pasteurization of milk is very limited the most likely route of transmission is through consumption of raw milk, but few studies have demonstrated the shedding of mycobacterium organisms through milk (5). Tuberculosis in humans is also increasing at an alarming rate and affects mainly the active working age group (15 – 45 years). This may have a negative influence on the national economy. More than 30% of TB patients have extra-pulmonary tuberculosis (6) and the majority of them were directly or indirectly in contact with cattle. This suggests the possible association that may exist between extra-pulmonary TB and *M. bovis*.

Types of study to be conducted

In order to assess the magnitude of BTB in animals and its zoonotic impact in humans a comprehensive surveillance study has to be conducted in all the geographical zones of the country. National studies should be carried out to investigate geographical areas affected, especially in pastoral areas, field prevalence and economical impact of the disease. Baseline epidemiological information is needed for assessing the most cost effective intervention for Ethiopia. Education and working capacity has to be strengthened and existing national structures should be used. Tackling a disease like BTB which affects both livestock and humans requires joint activities between the Ministry of Agriculture and the Ministry of Health. Only then can a control strategy can be developed based on knowledge based policy decisions.

Conclusions & recommendations

The close working relationship developed between the Ministry of Agriculture and Rural Development (MoARD) and the Ministry of Health (MoH), such as the National Coordination Committee created for the avian human influenza and Rift Valley fever threat can be used for BTB as well. Through this development an effective response can be mounted against BTB and other serious livestock diseases that have a significant public health component. Agreement can be reached on a joint framework to conduct a comprehensive surveillance program to assess the magnitude of human/bovine tuberculosis and come up with sound control strategies suitable for Ethiopia. The experience gained in developing preparedness and response plan for the threatened avian human influenza pandemic has helped to explore the opportunities for sharing resources between the two ministries, where appropriate, and to avoid unnecessary duplication. Therefore a joint effort of the two ministries as well as national and international research institutes is required more than ever to handle old and newly emerging zoonotic diseases.

Reference

1. Tadelle Kiros (1998): Epidemiology and zoonotic importance of bovine tuberculosis in selected sites of eastern Shoa, Ethiopia. MSc thesis, Addis Ababa University.
2. Ameni G, Aseffa A, Engers H, Young D, Hewinson G, Vordermeier M. Cattle husbandry in Ethiopia is a predominant factor affecting the pathology of bovine tuberculosis and gamma interferon responses to mycobacterial antigens. *Clin Vaccine Immunol.* 2006;13(9):1030-6.
3. Ameni G, Aseffa A, Engers H, Young D, Gordon S, Hewinson G, Vordermeier M. Both prevalence and severity of pathology of bovine tuberculosis are higher in Holsteins than in zebu breeds under field cattle husbandry in central Ethiopia. *Clin Vaccine Immunol.* 2007;14:1356-61.
4. Ameni G, Amenu K, Tibbo M. Bovine tuberculosis: prevalence and risk factor assessment in cattle and cattle owners in Wuchale-Jida District, Central Ethiopia. *The International Journal of Applied Research in Veterinary Medicine.* 2003;1(1):17-26.
5. Ameni G, Bonnet P, Tibo M. A cross-sectional study on bovine tuberculosis in selected dairy farms in Ethiopia. *The International Journal of Applied Research in Veterinary Medicine.* 2003;1(4):253-258.
6. Ministry of Health, Ethiopia. Health and Health indicators 1999 E.C.