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Evaluation of Therapeutic Trials in Bovines

Aneela Zameer Durrani, Muhammad Usman, Zain Kazmi and Muhammad Husnain

Abstract

Brucellosis is one of the most common and economically important zoonotic diseases globally. Office International des Epizooties (OIE) listed it as the second most important zoonotic disease. The disease affects almost all animals but importantly buffalo. The disease manifests itself in the form of abortion, still births, weak calves, infertility, and specific lesions on reproductive organs. It is prevalent worldwide but still a neglected disease. As a zoonotic disease its importance is multifarious for animals as well as public health. Taking into account poor health facilities and unawareness, its control becomes very significant. The difficulty to treat this disease and its zoonotic potential compel slaughtering as a best strategy to get rid of this disease. There are not too many therapeutic trials conducted to control bovine brucellosis. Instead many therapeutic trials have been conducted for treating human brucellosis. The therapeutic trial requires long term administration of drugs (almost 6 weeks) without any surety of complete recovery so it is a preferred practice to eradicate the animal or sell it out instead of treating.

Keywords: *Brucella*, bovines, therapeutic trial, slaughtering, zoonotic

1. Introduction

Brucellosis is one of the most common and economically important zoonotic diseases globally [1]. It was first discovered by Bruce in 1887. It is also known as undulant fever, Mediterranean fever, Epizootic abortion, Enzootic abortion, Malta fever, and Bang's disease [2, 3]. It is considered as the most rapidly spreading disease by the World Health Organization (WHO), Food and Agriculture Organization (FAO), and Office International des Epizooties (OIE) [4]. Significant economic losses due to brucellosis are abortion, low milk yield, low conception rate and culling of animal [5]. Central Asia, the Middle East and adjacent subtropical geographies are among those with the highest incidence of brucellosis among humans and livestock worldwide [6]. There is a reason to believe that the burden caused by brucellosis in low-income countries in Asia and Africa is large [1]. Important animal species that can get this disease include cattle, buffalo, swine, sheep, goats, camels, dogs and being zoonotic can also infect humans [7]. Prevalence of brucellosis in Buffalo is 5.05% in Pakistan [8]. This is suggested by quite an old study and conduction of a new research is required to study the current trends of brucellosis in Pakistan. It is for sure that its prevalence has increased to threatening level.

Brucella is Gram-negative, nonmotile, coccobacilli or small rods intracellular pathogen that are taxonomically categorized in the in the class α-proteobacteria, order

Rhizobiales, family Brucellaceae. It is caused by ingestion of unpasteurized milk or undercooked meat from infected animals, or close contact with their secretions [3]. It is caused by different bacteria of the genus *Brucella* characterized by abortion epididymis and orchitus. Brucellosis causes abortions in the third trimester of pregnancy when unvaccinated cattle are exposed to the infectious organism. Brucellosis has been reported since long in Pakistan and due to its increasing prevalence emphasis has been put on regular screening of livestock herds and of animals brought at abattoirs and at livestock markets [9]. The overall prevalence of brucellosis in Punjab is found to be 2.5%.

2. Diagnosis of brucellosis

Brucella spp. is considered as the most common laboratory-acquired pathogens. Several serological tests have been widely used for diagnosis of *Brucella* such are Rose Bengal plate test (RBPT), standard tube agglutination test (STAT), complement fixation test (CFT), enzyme linked immunosorbant assay (ELISA). Besides these, polymerase chain reaction (PCR)-based identification and typing and fluorescence polarization assays (FPA) are also important diagnostic tools [10]. These all diagnostic tools have been employed by various researchers to find out brucellosis. Shafee and other in 2011 used MRT and i-ELISA to find out overall prevalence of brucellosis in Quetta, capital of Baluchistan province of Pakistan [11].

ELISA and PCR are more specific tests to diagnose brucellosis but there are various limitations to these tests. Both of these tests are expansive and need sophisticated equipment to perform. Both cannot be performed in field conditions.

2.1 Therapeutic trial of brucellosis

The bovine brucellosis is very prevalent but a neglected disease on the whole. The countries which are declared as *Brucella* free countries managed to attain this status through slaughtering and destroying the *Brucella* positive animals along with effective vaccination. The literature confirmed that no country overcome it through treating the *Brucella* positive animals. The main reason behind this practice is the long duration of therapeutic trial, i.e., almost 6 weeks without any surety of complete recovery. In most of the cases, animals relapse the disease or act as a carrier for rest of their life.

Alavi and Ali Reza treated *Brucella* positive patients with doxycycline-rifampin and doxycycline-cortimoxazol and compared their efficacy. They concluded that the later combination has a better efficacy than former [12]. In another study the therapeutic efficacy of doxycycline and rifampicin (DR) with a doxycycline plus streptomycin (DS) were compared. It was concluded that doxycycline-aminoglycoside combination has a better efficacy and doxycycline-rifampin and doxycycline-cotrimoxazole should be the alternative regimens [10].

Hari and Sughanda conducted a different type of research and checked immunotherapeutic response in cattle using a specific biomarker. They are against brucellosis. The SL induced strong antibody response and RL reported successful use of phage lysates of RB51 (RL) and S19 (SL) against brucellosis. The SL induced strong antibody response and RL stimulated cell mediated immunity (CMI). Other than these, no therapeutic trial are available in literature for evaluation. The reasons of which have already been discussed.

3. Conclusions

Although bovine brucellosis is very prevalent and now reemerging still no therapeutic trial has been conducted since now. The main reasons behind include

the complex nature of *Brucella* infection, long duration of therapy, and relapse of disease after treatment.

Acknowledgements

Conflict of interest

The authors declare that there is no conflict of interest regarding the use of this data.

Abbreviations

OIE	Office International des Epizooties
WHO	World Health Organization
FAO	Food and Agriculture Organization
FPA	fluorescence polarization assays
CMI	cell mediated immunity
RBPT	Rose Bengal plate test
STAT	standard tube agglutination test
CFT	complement fixation test
ELISA	enzyme linked immunosorbant assay
PCR	polymerase chain reaction

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References

[1] Godfroid J, Nielsen K, Saegerman C. Croatian Medical Journal. 2010;**51**: 296-305

[2] Abubakar M, Mansoor M, Arshad MJ. Bovine brucellosis: Old and new concepts with Pakistan perspective. Pakistan Veterinary Journal. 2012;**32**(2):147-155

[3] Bano Y, Lone SA. Brucellosis: An economically important infection. Journal of Medical Microbiology & Diagnosis. 2015;**4**:208. DOI: 10.4172/2161-0703.1000208

[4] Pappas G. The changing *Brucella* ecology: Novel reservoirs, new threats. International Journal of Antimicrobial Agents. 2010. DOI: 10.1016/j. ijantimicag.2010.06.013

[5] Gul ST, Khan A. Epidemiology and epizootology of brucellosis: A review. Pakistan Veterinary Journal. 2007;**27**(3):145-151

[6] McDermott J, Grace D, Zinsstag J. Economics of brucellosis impact and control in low-income countries. Revue scientifique et technique (International Office of Epizootics). 2013;**32**:249-261

[7] Falade S. Serological response of sheep to *Brucella* melitensis rev. 1 Vaccine. Zoonoses and Public Health. 1983;**30**(1-10):546-551

[8] Ahmad R, Munir MA. Epidemiological investigation of brucellosis in Pakistan. Pakistan Veterinary Journal. 1995;**15**:169-172

[9] Ahmad T, Iahtasham K, Saddaf R, Saeed HK, Raheela A. Prevalence of bovine brucellosis in Islamabad and Rawalpindi districts of Pakistan. Pakistan Journal of Zoology. 2016;**49**(3):761-1149. DOI: 10.17582/ journal.pjz/2017.49.3.sc5

[10] Alavi SM, Alavi L. Treatment of brucellosis: A systematic review of studies in recent twenty years. Caspian Journal of Internal Medicine. 2013;**4**(2):636-641

[11] Rajala EL, Cecilia G, Isabel L, Nosirjon S, Sofia B, Ulf M. Prevalence and risk factors for *Brucella* seropositivity among sheep and goats in a peri-urban region of Tajikistan. 2016;**48**(3):553-558

[12] Alavi SM, Rajabzadeh AR. Comparison of two chemotherapy regimen: Doxycycline-rifampicin and doxycycline cotrimoxazol in the brucellosis patients AHVAZ, IRAN, 2004-2006. Pakistan Journal of Medical Sciences. 2007 (Part-II);**23**(6):889-892