

A Profile of Recent Upsurge of Brucellosis of Veterinary Health Care Workers Engaged in Brucella Vaccination Program in West Bengal, India

Satadal Das, Parthasarathi Sengupta

Abstract—With millions of livestock wealth in India including cattle, and buffaloes, the National Animal Disease Control Program targeted a massive Brucella vaccination program. As a part of it in the state of West Bengal Veterinary healthcare assistants participated in the program in 2021. The aim of this study was to elucidate the burden of brucellosis in those healthcare assistants and to pinpoint the main causes of such infection. We contacted the healthcare assistants to find out whether they were infected during the vaccination program. Our findings indicated many Veterinary healthcare assistants who participated in the program developed symptoms and signs suggestive of brucellosis. Laboratory tests indicated many confirmed Brucellosis cases. However, this may not include many asymptomatic cases. Detailed analysis revealed that in most of them there was a history of needle prick injury about a month back during the vaccination program, which was mainly due to ferocious or disturbed animals. Few also complained that they were not properly trained or proper personal protective types of equipment were not provided. All of them were treated in referral hospitals following a standard protocol of the Government Health Department and now they are followed up. Thus we conclude that proper care during the vaccination of animals should be followed, prophylactic treatment for needle prick injuries should be given, and training and supply of personal protective equipment should be monitored.

Keywords—Occupational brucellosis, needle prick injury, brucella vaccination, personal protective equipment.

I. INTRODUCTION

A reproductive disease mainly of cattle and buffaloes, the disease Brucellosis is caused predominantly by *Brucella abortus*. About 5,00,000 new human cases are reported annually by World Health Organization [1]. The infection causes fever, abortion, infertility, interrupted lactation, delayed heat etc. When transmitted to humans as a zoonotic disease, it causes fever, body aches, weakness and many other symptoms including psychiatric changes. There is no treatment for brucellosis in animals, however, the disease can be controlled by a lifetime single Brucella vaccination in 4-8 months old female bovine calves. The National Animal Disease Control Programme targeted to control Brucellosis by 2025 with vaccination and its eradication by 2030. State monitoring units are organized for the implementation of the program at the district, block and village levels.

The vaccine is Brucella S 19 vaccine. It is a live attenuated vaccine normally given to female calves as a single

subcutaneous dose of 5-8 x 10¹⁰ organisms. It contains a suspension of pure smooth live *Brucella abortus* of low virulence, but studies indicated that it can also prevent *Brucella melitensis* [2]. A standard guideline is also provided with the injection vial which should be followed.

Block Veterinary Office ensures trained manpower, syringes, needles, waste deposit bags, personnel protective equipment (apron, hand glove, plain protecting glass), etc., before starting vaccination in a block. The vaccinators should take extra care during the handling of live attenuated vaccines and during vaccinating animals. This is because accidental exposure may lead to the development of the disease brucellosis in the vaccinators. Thus, for proper use of personal protective equipment and vaccination animals, proper training is necessary.

In this study, we analyzed the recent reports of human brucellosis cases in veterinary health care assistants in a livestock brucella vaccination program in the West Bengal State of India.

II. REPORTS ANALYSIS

All reports of human brucellosis in Veterinary health care assistants engaged in a livestock brucella vaccination programme in 2021 in West Bengal State of India were collected and analyzed. At present there are 13000 veterinary health care assistants in West Bengal State of India and among them about 6000 were engaged in the vaccination programme (Fig. 1). More than 400 were presented with symptoms suggestive of brucellosis, among them 13% were confirmed positive by laboratory tests. Almost all of them gave history of needle prick injury on an average about a month back during the vaccination programme. Several positive patients took admission in referral hospitals. Usual symptoms were fever, headache, pain in the chest, eye, neck, extremities, vertebral column etc. Some patients stated that they could not tolerate the sunshine, even the light emitted from the mobile. All of them treated properly following a standard protocol given by the state health department.



Fig. 1 Brucella vaccination by veterinary health assistant



Fig. 2 Brucella vaccination by veterinary health assistant without any personal protection

III. DISCUSSION

Brucella vaccines used in veterinary practice are the major sources of brucella transmission [3], [4]. Veterinary assistants are usually exposed to live attenuated vaccines (REV-1, S19 and RB51), and in this way, they are infected [3]. Accidental exposure to the vaccination was reported more with REV-1 (61.43%) than RB51 (27.14%) and S19 (10.00%) [5]. In a meta-analysis by Pereira et al. [5], accidental exposure to live attenuated anti-brucellosis vaccine was found an important risk factor involved in occupational infection. It was also observed that a lack of knowledge of brucellosis and negligence in personal protective measures increases the probability of infection. In a study done by Tiwari et al. [6], it was found that knowledge of animal vaccinations is less in animal handlers and para-veterinarians compared to veterinarians. In this paper, all veterinarians considered animal vaccination against brucellosis necessary, while 84% of para-veterinarians and 76.6% of

animal handlers considered animal vaccination important for brucellosis. Usually, the animal becomes ferocious or gets disturbed while carrying out vaccination and this leads to needle prick injury. Thus, this study indicated that proper training of veterinary assistants is most important to prevent such occupational hazards.



Fig. 3 Brucella vaccination by veterinary health assistant without any personal protection



Fig. 4 Brucella vaccination by veterinary health assistant without any personal protection

In most of the studies, it was found that there is poor knowledge among healthcare workers regarding the prevention and control of brucellosis. In a study, it was found that the

majority of healthcare workers do not know the transmission routes of brucellosis [7]. In another study, it was found that they were not aware that wearing gloves is important during handling animals for the disposal of aborted materials [8]. All these indicate that unless these issues are solved, brucellosis in healthcare workers is going to rise in future. In the Indian scenario, almost similar findings have been reported earlier [9]. In this connection, it is important to note that although there is a lack of knowledge regarding brucellosis among healthcare workers, there is always a positive attitude among them toward the control of brucellosis. Thus, in studies in Sri Lanka and Uganda, the authors observed these positive attitudes [10], [11]. However, it is not universal, as a study in South Western Uganda reported a negative attitude among healthcare workers regarding the control of brucellosis [12]. Thus, although there are good attitudes if we look into the occurrence of brucellosis in healthcare workers it is contemptible to observe that a good attitude toward brucellosis control is not properly addressed everywhere and it is always a neglected disease. There are hundreds of healthcare workers suffering from chronic brucellosis, even neurobrucellosis and instead of good treatment, there is no cure. There are many psychological problems also which are overlooked. There are healthcare workers with brucellosis who forgets everything and cannot move without any helper. If we see the zoonotic diseases, then we may be shocked to see that among all zoonotic diseases brucellosis is ignored throughout the globe. If we also consider the diagnostic facilities of brucellosis in different countries then it also indicates a very poor scenario. In most areas, there are SAT (Serum agglutination test) and RBT (Rose Bengal Test) only. ELISA Facilities for brucellosis are present in only a few centers and if we consider molecular diagnostic facilities, it is almost absent.

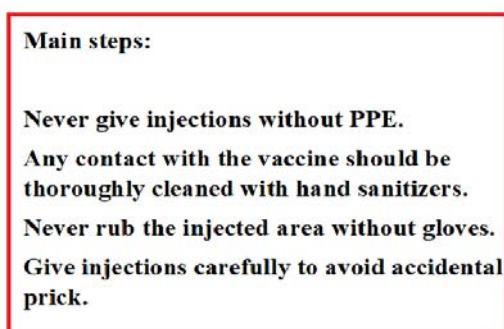


Fig. 5 Steps to be followed by health workers.

One may follow one health approach (holistic health) [13], [14] or an Ecohealth approach [15] to control various zoonotic diseases. There are two distinct areas of intervention as advocated by Baron-Epel et al. [16], the prevention and control of the disease in animals; and the prevention and control of the transfer of the disease to humans. However, Ottawa's charter areas of action (WHO) contain five different aspects regarding this [20]. The main items are the development of healthy public policy, supporting environment development, strengthening community action, personal skill development, and

reorientation of health services. These include mandatory registration of herds, national monitoring, testing, culling, immunization following standard protocol, developing a strong veterinary service, and many other important issues [17]-[19]. In our observation, we find that if the health workers follow simple four steps, then the chance of infection will be much less [Fig. 5].

IV. CONCLUSION

Proper care during the vaccination of animals should be followed, prophylactic treatment for needle prick injuries should be given, and training and supply of personal protective equipment should be monitored.

REFERENCES

- [1] Pappas G, Papadimitriou P, Akritidis N, Christou L, Tsianos EV. The new global map of human brucellosis. *The Lancet Infectious Diseases*. 2006;6(2):91–9. PMID:16439329
- [2] van Straten M, Bardenstein S, Keningswald G, Banai M. Brucella abortus S19 vaccine protects dairy cattle against natural infection with *Brucella melitensis*. *Vaccine*. 2016 ;34(48):5837–5839. doi: 10.1016/j.vaccine.2016.10.011. Epub 2016 Oct 19. PMID: 27771184.
- [3] Ashford DA, di Pietra J, Lingappa J, Woods C, Noll H, Neville B, et al. Adverse events in humans associated with accidental exposure to the livestock brucellosis vaccine RB51. *Vaccine*. 2004;22(25–26):3435–9. PMID:15308369.
- [4] Brough HA, Solomon AW, Wall RA, Isaza F, Pasvol G. Brucellosis acquired by eating imported cheese. *Journal of paediatrics and child health*. 2011;47(11):840–1. Epub 2011/02/01. PMID:21276115.
- [5] Pereira CR, Cotrim de Almeida JVF, Cardoso de Oliveira IR, Faria de Oliveira L, Pereira LJ, Zangerônimo MG, et al. (2020) Occupational exposure to *Brucella* spp.: A systematic review and meta-analysis. *PLoS Negl Trop Dis* 14(5): e0008164. <https://doi.org/10.1371/journal.pntd.0008164>
- [6] Harish K. Tiwari, Vishal Proch, Balbir B. Singh, Kathrin Schemann, Michael Ward, Jaswinder Singh, Jatinder P.S. Gill, Navneet K. Dhand, Brucellosis in India: Comparing exposure amongst veterinarians, para-veterinarians and animal handlers, *One Health*, Volume 14, 2022, 100367, ISSN 2352-7714, <https://doi.org/10.1016/j.onehlt.2021.100367>.
- [7] Mligo, B.J., Sindato, C., Yapi, R.B. et al. Knowledge, attitude and practices of frontline health workers in relation to detection of brucellosis in rural settings of Tanzania: a cross-sectional study. *One Health Outlook* 4, 1 (2022). <https://doi.org/10.1186/s42522-021-00056-5>.
- [8] Karimuribo E, Kusalika L, Mdegela R, Kapaga A, Sindato C, Kambarage D. Studies on mastitis, milk quality and health risks associated with consumption of milk from pastoral herds in Dodoma and Morogoro regions, Tanzania. *J Vet Sci*. 2005;6(3):213–21
- [9] Govindaraj G, Mohandoss N, KR N, R Shalini, Shome R, RG B, Sairiwal L and Rahman H. Assessment of brucellosis knowledge, attitude and practice among veterinarians in India. *J Exp Biol Agric Sci*. 2016;4:S83–94
- [10] Nabirye HM, Erume J, Nasinyama GW, Kungu JM, Nakavuma J, Ongeng D, et al. Brucellosis: community, medical and veterinary workers' knowledge, attitudes, and practices in northern Uganda. *Int J One Health*. 2017;3:12–8.
- [11] Kothalawala Kacha, Makita K, Kothalawala H, Jifry AM, Kubota S, Kono H. Knowledge, attitudes, and practices (KAP) related to brucellosis and factors affecting knowledge sharing on animal diseases: a cross sectional survey in the dry zone of Sri Lanka. *Trop Anim Health Prod*. 2018;50:983–9.
- [12] Kansime C, Atuyambe LM, Asimwe BB, Mugisha A, Mugisha S, Guma V, et al. Community perceptions on integrating animal vaccination and health education by veterinary and public health workers in the prevention of brucellosis among pastoral communities of South Western Uganda. *PLoS One*. 2015;10(7):1–15
- [13] Asokan G V. One Health and Zoonoses: The Evolution of One Health and Incorporation of Zoonoses. *Cent Asian J Glob Heal*. 2015 Jul 23;4(1):139. PMID:29138713
- [14] American Veterinary Medical Association. One health: A new

- professional imperative (Internet). One Health Initiative Task Force Final Report. 2008. p. 76. Available from: https://www.avma.org/sites/default/files/resources/onehealth_final.pdf
- [15] Mi E, Mi E, Jeggo M. Where to now for one health and ecohealth? Ecohealth (Internet). 2016 Mar 11 (cited 2021 Sep 12);13(1):12–7. Available from: <https://link.springer.com/content/pdf/10.1007/s10393-016-1112-1.pdf> pmid:26968555
- [16] Baron-Epel O, Obeid S, Kababya D, Bord S, Myers V (2022) A health promotion perspective for the control and prevention of Brucellosis (*Brucella melitensis*); Israel as a case study. PLoS Negl Trop Dis 16(9): e0010816. <https://doi.org/10.1371/journal.pntd.0010816>
- [17] Anis E, Leventhal A, Grotto I, Gandacu D, Warshavsky B, Shimshony A, et al. Recent trends in human brucellosis in Israel. Isr Med Assoc J (Internet). 2011 (cited 2021 May 9);13
- [18] Shimshony A. Epidemiology of Emerging Zoonoses in Israel. Emerg Infect Dis (Internet). 1997 (cited 2021 Apr 28);3(2):229–38. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2627617/> pmid:9204309
- [19] Ministry of Agriculture. Regulations for animal diseases (eradication of brucellosis in remnants 1989). Hebrew. https://www.nevo.co.il/law_html/law01/212_043.htm