Biological agents: Uncontrolled entry of exotic pathogens a major dent for Indian economy and security

Dr. Y. Ashok Babu

The author is a Scientist-C, Defence Research and Development Establishment, DRDE, Gwalior.

Summary

During and after World War II, various kinds of biological agents were weaponised. These included anthrax causing bacilli, vibrio cholera, and burkhalderia species against livestock, among others. All the countries that are signatory to the BWC have destroyed stockpiles of biological warfare agents. Small quantities of samples are still available with some of developed countries for the purpose of developing vaccines and detection technologies in case of future outbreaks.

The history of use of biological agents (BW) date backs to 595BC, where extracts of toxic plants hellebore was used to poison the water supply of town Delphi during first sacred war. Since then, use of biological agents evolved both in variety and delivery technology till Biological Weapons Convention came in force in 1973, which has reduced the threat of use of biological warfare agents. However, even before that, with the development of nuclear bomb, use of biological agents as weapons of choice become less attractive since biological agents lack the magnitude of destruction when compared to nuclear weapons and also due to the fact that medical technologies to contain the spread of most of the biological agents advanced due to breakthrough research. However, with the recent terrorist incidents and increased threat from non-state players, the threat of possible use of BW agents has re-emerged.

Based on the potential extent of destruction a biological agent can cause, they are classified in to two different groups; 1.Contagious pathogens such as bacteria, virus which can spread rapidly across the population causing mass destruction and 2.Biological toxins, which are non-contagious but are highly lethal such as botilinumtoxin, risin, saxitosin etc.

During and after the World War II, various kind biological agents were weaponised. It most included anthrax causing bacilli, vibrio cholera, and burkhalderia species against livestock, among others. All the countries that are signatory to the BWC have destroyed stockpiles of biological warfare agents. Small quantities of samples are still available with some of developed countries for the purpose of developing vaccines and detection technologies in case of future outbreaks. Though India does not have any biological warfare agents in its procession, it has signed and ratified the BWC in 1973.

The Present Scenario

The threat of the use of biological agents by non-state players reemerged after the controversial use of anthrax spores in the mails sent to US congressmen. Subsequently, the threat perception has become larger than the threat itself. This changed perception has tremendously increased the financial burden on developed and developing countries alike. The cost of development of defense against BW agents is enormous when compared to that of developing the weapon, especially in the developing and poor countries where the infrastructure is poor. Development of defence technologies in this area includes surveillance, detection (Diagnosis), prognosis and protection (medical protection). The complexity of detection and protection against biological agents varies between types of pathogen. For example, viral agents are most potent of the biological agents due to the complexity of development of protection techniques when compared to other pathogens and also due to their rate of spread to larger areas.

In the recent times, there have been outbreaks of infection with various exotic and mutant viral pathogens across the world which includes avian influenza, SARS, Swine flu, Dengue fever etc. The rapidity of spread and virulence of these pathogens is comparable to that of any classified biological agents. Unfortunately all these exotic infections have had easy entry into India and they have caused enormous loss in both human and financial terms. As mentioned earlier, the spread of this pathogen is faster than any other bacterial pathogen. Therefore, rapid development of diagnostic techniques and procurement of medicines is essential which in turn causes enormous financial burden. Contrary to belief, during the recent instances of outbreaks, even though temperate climates were more favorable for spread of pathogen, many countries such as Japan, USA, and EU members were successfully able to contain the spread of these pathogens due to the availability of modern infrastructure and effective surveillance. As mentioned earlier, surveillance is the first and strongest step to contain spread of pathogen. However, in many cases, surveillance and detection work together to contain spread of pathogens. Focusing on the above aspects tremendously reduces the risk of infection and also eases the associated financial burden. Disease or pathogen surveillance in the above scenario is a co-ordinate task involving people of various expertises ranging from intelligence and law enforcement agencies to scientist and doctors. As pathogenicity and ease of spread of diseases like SARS is comparable to BW agents, preparedness to combat against these exotic pathogens should be at the same level. Japan and other countries successfully prevented the entry and spread of exotic pathogen by many tier surveillance and monitoring systems right from the entry points such as Airports, Sea ports and other cross country entry points. They were successful because preventive measures of pathogen surveillance are cost effective when compared to enormous financial burden that the spread of pathogen bring about.

Conclusion

India's biotechnology and pharmaceutical industries are developing in positive ways. They are also interacting with other agencies to increase their effectiveness in research and development of appropriate medicines. However, since India is a developing and expanding market, efforts need to be made to put in place adequate checks and balances to ensure that their growth is not harmed because of vested interests. At another level, there is a necessity for effective disease surveillance right from the point of entry into the country to prevent spread of exotic and dangerous pathogens. These prophylactic

measures can effectively reduce the financial burden and loss of human life.

References

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