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Corresponding Author

Dr. Romy Biswas
Professor and Head,
Dept. of Community Medicine,
Maharaja Jitendra Narayan Medical College, Cooch Behar.
Email: romyrak-tim@yahoo.com

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The comeback of old and new diseases:
How prepared are we?

Humans have been in a constant companionship with pathogenic organisms, livestock, and have cultivated plants throughout evolution. Over centuries new organisms emerged as humans crossed ecological barriers with evidence of severe epidemics over centuries. With changing genetics of pathogens and human ecology, there have been new emerging diseases. The manifestation of outbreaks caused by these novel infectious diseases, not only poses a significant threat to public health but also exerts a substantial burden on the global economies. In India, the country's vast terrains with extreme climatic changes added with different dynamic population distribution gives rise to emerging and re-emerging infectious diseases (EID and REID). We face a triple burden of communicable diseases, non-communicable or lifestyle diseases as well as emerging and re-emerging diseases.

Emerging diseases are diseases that have not occurred in humans before or have occurred previously but affected only a small number of people in secluded places; or have occurred throughout human history but have only recently been recognized as distinct diseases or as a result of a new mutant strains.[1] According to CDC, emerging diseases are defined as diseases whose incidence in humans have increased in the past two decades, causing public health problems. Re-emerging diseases, on the other hand, are defined as diseases that were once major health problems and had subsequently declined dramatically but are recently reoccurring, leading to major health complications.[2] There is interplay of a large number of factors behind emergence and re-emergence.

India reported Nipah virus disease (NiV) outbreak from Kozhikode and Mallapuram districts of Kerala in May 2018. There have been 17 deaths and 18 confirmed from the first NiV outbreak in South India.[3] In West Bengal, the northern districts are known endemic zones for many outbreak prone communicable diseases like malaria, Japanese encephalitis, scrub typhus, dengue, and kala-azar, each presenting with varied clinical and epidemiological presentation. West Bengal has also witnessed outbreaks of Nipah virus in 2014.[4] About 75% of emerging infections are zoonotic, with two-thirds originating in wildlife due to close interaction.[5] The presence of various factors such as poverty, overpopulation and inadequate preventive health system, makes South East Asia uniquely prone to develop many of the emerging infections.[6]

Several factors like globalization, industrialization, technology and industry, microbial adaptation, human behavior, travel trade and mass gatherings in different festivals and breakdown of public health measures are associated with the increase of these diseases. Climate change has been a major reason.[7] Respiratory viral infections, arboviral infections and bat-borne viral infections represent three major categories of emerging viral infections in India with re-emergence of Chikungunya and Zika.[8] The authors of a 2008 review calculated that 60.3% of all emerging disease events from 1940-2004 were of zoonotic origin and 71.8% of those zoonotic events emerged from the wildlife.[9] Additional factors like therapeutic or acquired immunosuppression can render populations susceptible to infections not previously recognised in humans. The weaponisation of pathogenic organisms for biological warfare or terrorism further adds to human-to-human transmission.

This emerging disease will primarily come from two likely sources, first being the acquired new genetic material in pathogens and second being the already existing organisms entering new ecological niches and spreading broadly. Antimicrobial resistance (AMR) that is resistance to the drugs is another important factor in the emergence/re-emergence of infections. Both overuse and inadequate use can lead to drug resistance. Finally, genetic alteration in the organism is important factor that can cause emergence of a disease.

The Department of Health Research (DHR), Ministry of Health & Family Welfare, Government of India and Virus Research and Diagnostic Laboratory (VRDLN) have established a well-functioning disease surveillance system. Regular monitoring and evaluation would be critical to the overall succ-

-ess of the preventive programmes. Community awareness and participation with this robust diagnostic system will help in control and prevention.

Human behavior is complicated and ever changing. Concerted efforts of basic, translational and applied research are needed towards development of advanced measures such as surveillance tools, diagnostic tests, vaccines and therapeutics to suit changing behavioural patterns. Although the role of chemoprophylaxis and vaccines are limited in these areas, research into novel antiviral strategies and rapid response platforms is ongoing. Infection control practices, and ensured use of Personal Protective Equipment's (PPE) and availability of drugs and vaccines, are necessary to handle the outbreaks in a better way.

The One Health approach is a program to build coalition between medical field, veterinary medicine and environmental sciences to improve the health of humans, animals, and ecosystem. The decision to establish the centre for one health at Nagpur, Maharashtra under the aegis of ICMR is a significant milestone for India to enhance the research infrastructure. One Health integration, recognizing that human health is inextricably linked to the health of animals and our shared environment. One Health is an important approach to improve the effectiveness of public health response and interventions as well as recruitment and application of multiple areas of expertise to work together to fight against EIDs or REIDs.[10] There should be a robust One Health strategy towards establishing a cross-cutting collaborations between animal, human and wildlife health stakeholders.[11] Humans will continue to experience new and re-emerging infections for which we will require robust, flexible and timely response to tackle it at various levels of health services.

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Dr. Romy Biswas
Professor and Head,
Department of Community Medicine,
Maharaja Jitendra Narayan Medical College, Cooch Behar
Email: romyraktim@yahoo.com