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Influenza A (H1N1) in India: Changing epidemiology and its implications

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Influenza viruses are highly unstable and capable of causing pandemics. A novel influenza virus can result through the exchange of genetic material among viruses from different animal, avian or human hosts.

During the 20th century, three pandemics in 1918, 1957 and 1968 were all caused by different novel virus strains.[1] Most recently, in 2009, a strain of influenza A (H1N1) virus pdm2009 emerged in Mexico and spread all over the world.[2] WHO declared it a pandemic.[3] Since then, A (H1N1) pdm2009 has replaced the previous A (H1N1) seasonal strain of influenza and has been seen regularly as a seasonal virus.

In India, this pandemic resulted in 27 236 cases and 981 deaths in 2009 and 20 604 cases and 1763 deaths during 2010.[4] Since then, influenza activity continued to be reported every year, especially in winter. However, 2017 was an unusual year, with the virus spreading rapidly in various parts of the country, and showing epidemiological characteristics different from previous years[5] in terms of period (two peaks observed), place (infection reported for the first time from some of the northeastern states) and person (comparatively more cases among children).

CHANGING EPIDEMIOLOGY

The Integrated Disease Surveillance Programme (IDSP) under the National Centre for Disease Control is entrusted with the responsibility of disease surveillance in the country and monitors the situation on a weekly basis with a view to detect early warning signals of any impending outbreak or any changes in epidemiology of diseases of public health importance and rapid response thereto.

During the post-pandemic period, the last major outbreak in India occurred in 2015 with 42 592 reported cases and 2990 deaths. This was followed by a low transmission period during 2016 when 1786 cases and 265 deaths were recorded.

During 2017, a total of 38 811 laboratory confirmed cases and 2266 deaths were reported to IDSP, which is more than eight times the number of deaths compared to the previous year and nearly three times higher than seen during the pandemic year, 2009. The largest burden was reported from Gujarat (7709 cases and 431 deaths), followed by Maharashtra (6144 and 778), Rajasthan (3619 and 279) and Madhya Pradesh (802 and 146). Together, these four states contributed nearly half (47%) the cases and more than two-thirds (69%) of deaths reported in India.

In comparison to previous years when increase in cases was observed in February–March, two peaks of influenza activity were observed in 2017: one during the winter months from February to April (peak in March) and then again more pronounced during summer months from August to October (peak in September). Most influenza activity in northern India was seen during the summer months, but in southern and western India, cases occurred mostly during winter months.

There was clustering of cases within the states, localized to a few districts such as Mumbai, Thane and Pune in Maharashtra and Jaipur in Rajasthan. Another observation was that some northeastern states such as Arunachal Pradesh and Tripura, which had never reported influenza A (H1N1) cases over the past 8 years, notified cases for the first time in 2017. These observations require looking into so as to understand the changing ecological and transmission dynamics, as well as potential changes in awareness and testing.

Among states with more than 100 deaths, the case fatality ratio ranged from 18.2% in Madhya Pradesh to 5.6% in Gujarat. These rates are far higher than those reported in most countries for H1N1pdm.[6] In Gujarat, most of the 431 deaths reported to have occurred were among those between the age of 15 and 60 years (67.9%), followed by ≥60 years of age (22.9%), with only 25 deaths (5.8%) among children under 5 years of age. As many as 259 (60%) patients who died in the state during 2017 had one or more comorbid conditions; the most common being cardiovascular conditions (35%); followed by diabetes (28%); lung diseases (12%) and renal diseases (9%).

Based on molecular analysis of isolates from Chennai and Pune, the dominant flu strain in India during 2017 was A/Michigan/7/2009 (H1N1) pdm09 virus, replacing A/California/7/2009 (H1N1) pdm09 seen during 2016.[7] In fact, the A/Michigan/7/2009 (H1N1) pdm09 strain has been isolated in Indian's for the first time.

PUBLIC HEALTH IMPLICATIONS

Influenza A (H1N1) continues to pose a major challenge to public health, causing many deaths each year and will continue to do so well into the foreseeable future. While most cases have resulted in mild and uncomplicated illness, many deaths have occurred, and the case fatality rate is higher than that in many other countries.[6] Adults of working age appear to be most seriously affected. Therefore, there is a need to have a high index of suspicion and to ensure that such patients are attended to in a timely manner.

IDSP data show that the epidemiology of influenza A (H1N1)

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is changing in terms of geographical distribution, age and seasonality. The evolving situation and the associated risk factors need continued monitoring and investigation with respect to the seasonal pattern of distribution of the disease, possibly linked with climatic conditions, seen during 2017. Understanding the genetic epidemiology of the virus in India would be helpful.

It is difficult to estimate precisely the number of people infected by the H1N1 virus, based on reported cases. The actual number of cases were likely greater as laboratory facilities for confirmation of the diagnosis are limited, and in many patients with flu-like illnesses, no tests for influenza A (H1N1) are performed. Many of those who were infected may not have developed symptoms, while others with mild illness may not have sought medical care.

It is becoming increasingly clear that the risk of complications and dying is higher among those with pre-existing conditions such as heart and kidney disease, obesity, respiratory diseases and among pregnant women.[8] Protecting such individuals through vaccination should remain a priority. Moreover, the clinical course in patients with comorbid conditions tends to be rapidly progressive and, in a matter of hours, can lead to complications and death. Such patients require immediate hospitalization and treatment with antivirals. The Government of India has issued a clinical management protocol which outlines the clinical presentation of seasonal influenza, the high-risk groups, and provides guidance on laboratory investigations, treatment protocol including criteria for administration of antivirals and supportive therapy.[9] These national guidelines must be adhered to by healthcare workers so that deaths can be prevented.

The influenza A (H1N1) virus remains susceptible to antivirals such as oseltamivir. WHO recommends the use of antivirals for the treatment of severe or complicated illness.[10] If virus activity has been detected in the community, antiviral treatment should not be delayed, especially in patients with pneumonia or progressive lower respiratory tract symptoms.

To better understand the nature of influenza illness and its future implications, research must be pursued in many areas. Epidemiological investigations should address issues relating to the distribution of cases and deaths by age, sex, etc., and the associated risk factors, including the possible impact of climate change. A uniform mechanism to collect, analyse and disseminate clinical, epidemiological and virology-related data could help public health policy and action. Monitoring of the genetic character of the virus and surveillance for drug resistance in the context of influenza A (H1N1) and other influenza viruses remain a high priority.

Conflicts of interest. None declared

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