

Influenza Vaccination – When and Why – An Analysis of Current Practice and Recommendation

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Abstract :

Influenza virus in its various forms is responsible for seasonal flu and a cause of concern as it is one of the biggest contributor of respiratory infections associated mortality. Various subtypes of viruses are in circulation. Every year, as per suggestion by WHO, the specific vaccine containing probable virus subtype is manufactured. Mainly two varieties of vaccines are suggested – for southern hemisphere and northern hemisphere – which is either trivalent or quadrivalent. Here we studied the various recommendations & actual data of influenza prevailing in various parts of India and other tropical countries. We reviewed the vaccine recommendations and have suggestions for making vaccination more effective for various regions of India by studying the published literature.

Key words: Influenza, Vaccination

Introduction :

Influenza is an acute respiratory illness caused by influenza A or B viruses and is a significant health burden on human populations across temperate, subtropical and tropical regions.⁽¹⁾ Influenza is a vaccine preventable disease and since more than 60 years its vaccines are available. It occurs in epidemics nearly every year, mainly during the winter season in temperate climates and almost throughout the year with seasonal peaks in tropical and subtropical regions.⁽²⁾ Influenza viruses change their antigenic characteristics frequently, and their subsequent spread depends upon the susceptibility of the population to viruses with novel antigens. The protection provided by influenza vaccines is based upon induction of virus-neutralizing antibodies, mainly against the viral hemagglutinin. Annual influenza vaccination is an important public health measure for preventing influenza infection.⁽²⁻⁴⁾

In India, the pattern of seasonal Influenza epidemic is different from temperate countries and there is a lot of variation in peaks in different parts of the country. Here we reviewed the literature of the published data related to actual cases of H1N1 influenza in various parts of India, other tropical countries and its peak numbers during the year. We also reviewed the WHO guideline for Influenza vaccination every year for northern hemisphere and southern hemisphere. We compared

tried to find the difference in disease pattern and relevance of official vaccination guideline by the Government of India and WHO.

Review of Literature :

We collected the published data by WHO, Government of India and reviewed scientific articles searched on PubMed and then compared the annual influenza vaccination recommendations by WHO, Government of India and other agencies like CDC of America etc. We tried to find out the unique requirements for vaccination strategy for preventing Influenza related morbidity and mortality in India.

Discussion :

In 2009, the first pandemic of Influenza of this century was declared in form of H1N1 variety. In year 2010, WHO reported the spread of laboratory-confirmed cases of pandemic influenza H1N1 2009 in more than 214 countries, including more than 18,449 deaths.⁽⁵⁾ As WHO announced H1N1 influenza to be in postpandemic phase on 10th August 2010, it was expected that H1N1 2009 virus would circulate as seasonal influenza virus for some years and localized outbreaks of various magnitude could occur.⁽⁶⁾ The striking seasonal pattern that characterizes influenza in temperate populations has long suggested a causal link between seasonal fluctuations in climatic and social factors and influenza transmission.^(7,8)

Temperate regions of the northern and southern hemispheres are characteristically having highly synchronized annual influenza epidemics during their

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respective winter months.^(7,8) In contrast, influenza seasonal characteristics are more diverse in tropical and subtropical regions; some sites experience annual epidemics coinciding with the local rainy season⁽⁸⁻¹²⁾, whereas others are characterized by semi-annual epidemics or year-round influenza activity without well-defined influenza seasons.^(9,11,12) Chadha M. S. et al. studied the distinct patterns of circulating strains of the virus in different areas of India from 2009 to 2013.⁽¹³⁾ Peaks of influenza were observed during July-September coinciding with monsoon in cities of Delhi and Lucknow (north), Pune (west), Allaphuza (southwest), Nagpur (central), Kolkata (east) and Dibrugarh (northeast), whereas Chennai and Vellore (southeast) revealed peaks in October-November, coinciding with the monsoon months in these cities. In Srinagar (Northern most city at 34°N latitude) influenza circulation peaked in January-March in winter months. The patterns of circulating strains varied over the years: whereas A/H1N1pdm09 and type B co-circulated in 2009 and 2010, H3N2 was the predominant circulating strain in 2011, followed by circulation of A/H1N1pdm09 and influenza B in 2012 and return of A/H3N2 in 2013. Antigenic analysis revealed that most circulating viruses were close to vaccine selected viral strains. In another study, analysis of various meteorological factors revealed that the peak of influenza positivity for each year from 2007 to 2010 coincided with peak of total rainfall during the monsoon season (July-August) in Delhi area.⁽¹⁴⁾ One more study by Koul PA et al. compared the data of two different hospitals in Srinagar and Delhi.⁽¹⁵⁾ They identified discrete patterns of influenza circulation in India. In Srinagar, a city in the northernmost region of India, influenza positivity rates peaked in winter (December-March), whereas in New Delhi, a city just ≈ 500 km south of Srinagar, influenza peaked during the monsoon season (July-September). Peaks of influenza circulation in Srinagar and New Delhi show seasonal patterns that depend on factors such as temperature, rainfall, humidity and latitude. In our own state Gujarat, data from 2009 to 2015 shows that peak influenza season is during rainy season followed by winter season.⁽¹⁶⁾ The latest data till March 2015⁽¹⁷⁾ also shows two distinct patterns of influenza peaks in India, i.e. rainy season and winter season.

Now coming to the vaccination part, it is well known fact that the effectiveness of influenza vaccines depends not only on the right match between vaccine strains and circulating viral strains, but also on the vaccine-induced immune response in the target population. Several types of influenza vaccine are regularly available in the market. The most commonly used one – inactivated influenza vaccine– induces neutralizing antibody responses that wane during the year.⁽¹⁸⁾ Therefore, appropriate timing of vaccination is a very important consideration in efforts to improve vaccine effectiveness. Better understanding of influenza seasonality and viral circulation is essential to select the best time for vaccination campaigns, which should precede the onset of the influenza season by several weeks.

Every year WHO predicts the influenza virus strain and accordingly companies manufacture influenza vaccine. Mainly two varieties are available – vaccine for northern hemisphere and vaccine for southern hemisphere. These vaccines are mainly targeted against peak influenza season in the temperate climate of both the hemispheres. Conventionally it is advised that Influenza vaccine is to be given during Nov-Dec every year for prevention against winter peak. However, influenza seasonal patterns are highly diverse in tropical countries and may be out of phase with the WHO recommendations for their respective hemisphere.

In one study, the peak timing of influenza activity for 125 countries using laboratory-based surveillance data from the WHO's FLUNET database was compared with the influenza hemispheric recommendations in place. Influenza vaccine recommendations for respectively 25% and 39% of the Northern and Southern Hemisphere countries were out of phase with peak influenza circulation in their corresponding hemisphere (62% and 53%, respectively, when the analysis was limited to the 52 countries in the tropical belt). These results indicate that routine influenza immunization efforts should be closely tailored to local patterns of viral circulation, rather than a country's hemispheric position.⁽¹⁹⁾ As we know, geographically, India falls in the tropical region between the equator and tropic of Cancer (23.4°N) and the subtropical region with latitude less than 40°N. Chadha MS et al.⁽¹³⁾ examined the relationship between influenza positivity and the

latitudes of the capital city of each state. Srinagar at the latitude of 34°N had an influenza peak in the winter, whereas most of the cities a latitude <30°N had influenza peaks during summer monsoon months (July-September). Chennai and Vellore located at the south-west location have peaks in November-December. Rainfall correlated with influenza peaks in all cities except Srinagar.

The current guideline of Government of India⁽²⁰⁾ does not speak at all about the timing of vaccination. We need to have different timings of vaccination for different regions of India as two main patterns of influenza circulation are already identified by different researchers. Data suggest that cities above 30° latitude and those with late monsoon season (Chennai and Vellore) can continue winter vaccination strategies; however those below 30° should consider vaccination in May-June. In both cases the most recent WHO vaccine formulation should be used.

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