Time Trend of Swine Flu at a Tertiary Care Centre of Western Rajasthan: A Decadal Analysis

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ABSTRACT

Background: Swine flu had been established as seasonal influenza, but antigenic variation continues to result in epidemics that necessitate continued surveillance. Present study aims to describe the time trend of swine flu from its initiation in 2009 to 2019 from western zone of Rajasthan.

Material and Methods: This secondary analysis of swine flu data from established seasonal disease reporting was conducted at a tertiary care centre of western Rajasthan which was the only swine flu testing centre in this area. Only Lab confirmed cases from this centre were included for month wise distribution.

Results: First case from Jodhpur was seen in August 2009. Large peaked outbreaks were seen around every 4 years namely 2009-10, 2014-15, 2018-19 corresponding to the antigenic variation of this virus namely California, Michigan and Brisbane strain respectively. Cases were seen in mostly in winters with peak in December/January. Mortality rate among these lab confirmed cases varied from 0–22% in different outbreaks.

Conclusion: Continued laboratory surveillance is necessary to identify the time pattern of outbreaks and for early identification of emergence of new strain to ensure early and timely preparedness for impending epidemics.

Keywords: Swine flu, influenza, outbreak, epidemic, pandemic

INTRODUCTION

Influenza, or flu, is an infectious disease caused by influenza virus, that spread through contact with contaminated droplets in the air[1] A century have passed after the devastating 1918 influenza pandemic- The 'Spanish flu', and still influenza continues to be a global public health problem.[2,3] Pandemics due to the descendants of this 1918 strain[4], have taken tolls of lives in 1957 and 1968 and the latest in 2009 known as 'swine flu'.[2,3]

Swine flu pandemic started in Mexico in April 2009 and rapidly spread throughout the world including India and WHO declared it as a pandemic on 11 June 2009.[5] The disease started in India in May 2009 and

the first case in Rajasthan was reported on 23rd July 2009.[6] Regional epidemics continue to occur annually, causing significant morbidity and hospitalizations.[4] New influenza pandemic leads to extinction of previously circulating virus strains and itself gets established as seasonal circulating strain.[4]

Though WHO had reported slight decrease in Influenza activity in India, but most commonly it is due to influenza A(H1N1) pdm09 virus and some due to influenza A(H3N2) viruses.[7]

As diagnosis of human influenza is mostly clinically, other respiratory viruses infection (rhinovirus, respiratory syncytial virus, parainfluenza and adenovirus) that can also present as Influenza-like Illness

(ILI) make clinical differentiation of influenza from other pathogens difficult, particularly during periods of low influenza activity and outside of epidemics situations.[8] Also swine flu is known to show continuous antigenic variation with evolution of new strains. This rationalizes epidemiological study of lab confirmed influenza for accurate data regarding circulating viruses. Hence, present study aimed to describe the time trend of lab confirmed swine flu from a tertiary care centre of western zone of Rajasthan.

MATERIAL AND METHODS

This cross sectional secondary analysis of swine flu data was conducted at department of Community Medicine of a tertiary referral hospital of western Rajasthan which caters a large geographical area and population of western zone of Rajasthan. Information regarding total number lab confirmed cases of swine flu and deaths due to swine flu was retrieved from digital stored data gathered during regular seasonal disease reporting including swine flu. Only laboratory confirmed cases from this centre, of any age and either gender were included in the study. Lab confirmation of suspected swine flu cases has been done using RT PCR technique using throat swabs/nasopharyngeal swabs samples right from the initiation of outbreak. Patients found positive by any other method like card test or admitted in private hospitals were excluded from the study. Information was collected regarding total number of sample tested from ILI patients, positivity for swine flu, deaths from swine flu. Time of positivity for swine flu was considered as the time of occurrence of that case. Death in a positive case was considered as death from swine flu irrespective of other immediate or underlying cause except for accidental causes.

Statistical analysis– Data was complied in MS Excel spread sheet. Categorical variable were expressed as frequency and percentage. Time distribution of cases was presented graphically to determine any periodic pattern of occurrence of cases.

RESULTS

Swine flu case was first reported in Jodhpur in August 2009 with 686 lab confirmed cases in the 2009-10 outbreaks with peak occurring in December. There was gradual decline in number of cases in 2010-12 with another small peaked outbreak in winters of 2012-13. The winter of 2014 -15 recorded another large peaked outbreak with 670 confirmed cases. Then there was again decline in no of cases and after 4 years period another large outbreak occurred in 2018 – 19 with 945 lab confirmed cases. Most of the outbreaks started in the month of august / September with peak in December / January (Figure 1/Table 1). The positivity rate for swine flu among sample from patients with influenza like illness varied from 1.4% to 31.9% in different years (Table 2). Mortality rate due to swine flu in different years varied from 0 to 20% since its origin in 2009 (Table 2).

Table 1: Time distribution of Swine flu cases from 2009 - 2019

Month	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
January	-	85	0	5	104	0	30	0	0	72	528
February	-	55	1	4	85	0	582	1	0	39	238
March	-	0	0	21	20	0	55	0	5	14	21
April	-	0	3	30	0	0	0	0	4	0	1
May	-	0	6	0	0	0	0	0	0	0	2
June	-	0	0	0	0	0	0	0	0	0	
July	-	1	0	0	0	0	0	0	0	0	
August	2	25	1	0	0	0	0	0	12	0	
September	2	89	0	2	0	0	0	0	74	5	
October	4	21	0	8	0	0	0	0	10	13	
November	190	0	0	19	0	0	0	0	6	14	
December	348	0	2	89	2	3	0	0	40	123	

Table 2: Year wise distribution of number of sample tested and positivity for swine flue

Year	Sample tested	Positive	Mortality
2009		547	67 (12.2%)
2010	866	276 (31.9%)	20 (7.2%)
2011	194	13 (6.7%)	4
2012	703	178 (25.3%)	23 (12.9%)
2013	1112	211(19.0%)	48 (22.7%)
2014	130	3 (2.3%)	2
2015	2981	670 (22.5%)	74 (11%)
2016	73	1 (1.4%)	0
2017	927	151 (16.3%)	25 (16.6%)
2018	1721	280 (16.3%)	48 (17.1%)
2019	2934	790 (26.9%)	69 (8.7%)

DISCUSSION

Influenza pandemics cause significant mortality and morbidity with overburdened health services.[1]

The latest pandemic occurred in 2009 beginning in Mexico. The first case of swine flu from Jodhpur was seen in August 2009, i.e. within 2 months of Declaration of pandemic by WHO. Number of Lab confirmed cases in 2009–10 were 686. India witnessed three waves during pandemic of 2009-2010, first one in 2009 September, second wave in December, and the third peak in August 2010 when end of pandemic was declared.[3]
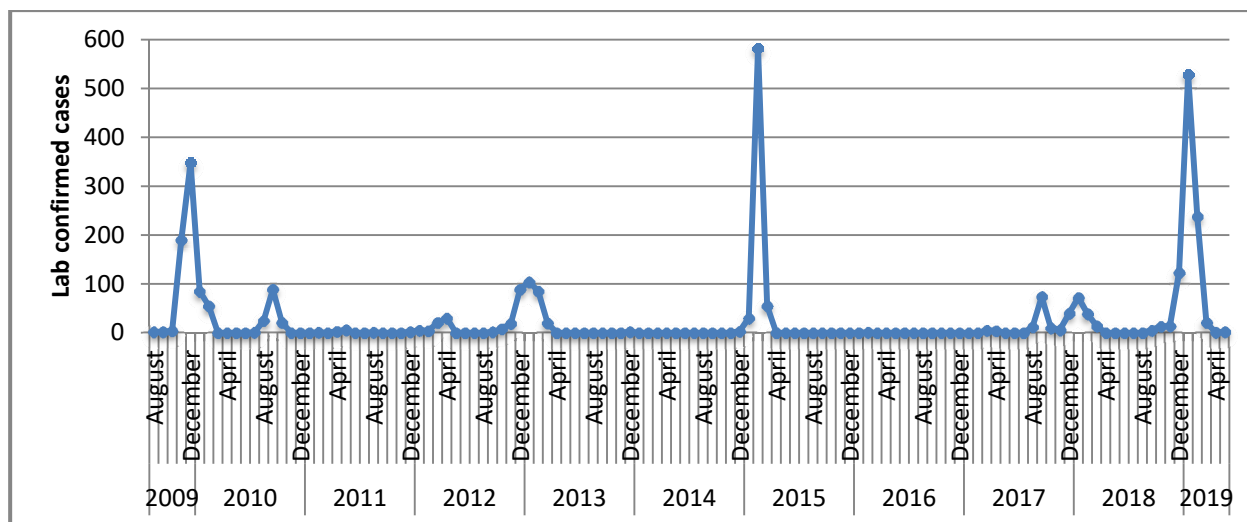
Figure 1: Time Distribution of Swine Flu cases from 2009 to 2019

Jodhpur witnessed peak in December 2009 because of late entry of HINI virus in this population, probably because of relatively less connectivity as compared to other metropolitan cities.

Most of the cases in all outbreaks occurred in the months of August to April, with peaks occurring between December and February, indicating winter pattern for swine flu with few cases reported even in summer. Most studies from India and other countries have also reported peaks in December or January.[1,6,9–11] Past literature of Influenza have shown that In temperate climates, seasonal epidemics occur mainly during winter, while in tropical regions, influenza may occur throughout the year, causing outbreaks more irregularly.[8] A weekly analyses in US observed that the earlier the epidemic peak occurred, the larger the peak size[1], which indicates faster spread of virus in the community. Various surveillance studies have demonstrated that relative humidity, rainfall and differences in temperatures influence the outbreaks of Influenza.[12]

After 2009, H1N1 was declared as seasonal influenza and cases occurred but in less number in Jodhpur in 2010-11 and 2011-12 as expected due to development of natural immunity in the population. A resurgence was seen in 2012-13 as was similarly reported by many northern and western states of India.[10,11] Influenza virus is known to show genetic mutations in form of antigenic drift responsible for pandemics strain and antigenic shift responsible for epidemics.[13] This antigenic variability prevents protection by immune response from past infections, leading to annual epidemics of "seasonal influenza".[14]

Also antigenic drift lead mutant strain could be responsible for the peaked outbreaks in 2014-15 from the study area as well as from many parts of India[10,15–18] and the A/Michigan/45/2015 stain could be responsible for these outbreaks[19],again a decline was seen in number of cases for next three winters and a further mutation could have been responsible

for the large outbreak in 2018-19, probably caused by the Influenza A/Brisbane/02/2018 (H1N1) pdm09-like virus, as indicated by recommended virus strain for influenza vaccine by WHO[20]. The latest circulation showed peak during January – February 2019 in Jodhpur. Global Influenza Surveillance and Response System (GISRS) have also reported the latest peak from India in month of January –February 2019.[21,22] The positivity rate for swine flu among sample from patients with influenza like illness varied from 1.4% to 31.9% in different years, as reported similarly by other studies.[10,11,15,17,23]

Various studies have reported mortality rate among positive patients ranging from 0% to 27%.[4,16,17,23–25] The slightly higher death rate in some outbreaks in this study could be due to delayed presentation of patients with severe disease from far flunked areas as the study centre caters a wide geographical area. The time trend of swine flu in this study indicates significant outbreak every 4th/5th winter corresponding to antigenic mutation. As climate seems to be a natural break for each outbreak of swine flu, anticipating earlier seasonal flu epidemics can be beneficial for early Public heath measure to suppress the peak of each outbreak and hence the total number of cases.

Vaccination is the most effective way to prevent disease from influenza[1] specially for high risk population and could be planned in advance of expected outbreak to curb mortality during each outbreak. Special preparedness could be made after 3 years of major outbreak in a region when new mutant strain is expected.

CONCLUSION

Major outbreak of swine flu was seen after every 4 – 5 years. Continuous monitoring is necessary for early detection of any antigenic variants to understand the seasonality and analyze role of factors like tempera-

ture, rainfall and humidity in the transmission of influenza viruses. As outbreaks mostly began during early winter, public health system should be prepared for early case detection to reduce the burden and transmission of disease.

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