

EPIDEMIOLOGICAL CHARACTERISTICS OF H1N1 POSITIVE DEATHS: A STUDY FROM TERTIARY CARE HOSPITAL IN WESTERN INDIA

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ABSTRACT

Background: In India as of 31st March 2010, there were 30917 laboratory confirmed H1N1 positive cases out of which 1453 were deaths with positivity index of 22.87% and mortality was 4.8%. But there was alarming sign after comparing these figures with those on 3rd October 2010 which showed 44687 confirmed H1N1 Positive cases with 2574 deaths with rise in positivity index to 23.3% and mortality rate of 5.7%. From the available data core issue of deaths occurring due to H1N1 positivity in short period of time in this year and risk factors associated with fatality were needed to look in detail.

Aims & Objective: To study the epidemiologic characteristics of reported deaths, high-risk profiles linked with underlying disease among reported deaths who died after infection with H1N1 influenza..

Material and Methods: Retrospective Record based study. Data was collected from prescribed format for swine flu patients admitted in IIW (Identified Isolation Ward) of Tertiary care hospital in Pune, State Maharashtra, India. Epidemiological characteristics like age, gender, residential address, time lag of Oseltamivir (Tamiflu) initiation, co morbidities, etc. were included. Confirmation of H1N1 positivity among cases was done by conducting Real Time PCR at National Institute of Virology, Pune. Trend of Occurrence of positive cases and death was drawn. Results were presented in the form of percentages for the respective variables. Case fatality rate was calculated for H1N1 Deaths.

Results: Maximum positive cases and deaths were in the month of August 2010. Deaths were more among age group of 20 years and above and female's proportion was high. Thirty one deaths were in Pune urban area from April 2010 to September 2010. Time lag in initiation of Oseltamivir (Tamiflu) was seen among 63 (79%) deaths. Asthma, Diabetes and hypertension were co morbid condition and pregnancy was associated condition with H1N1 fatality.

Conclusion: Mortality was seen among adult population. Time lag in initiation of Oseltamivir (Tamiflu) was seen among majority of deaths.

KEY-WORDS: H1N1 Positive Deaths; Tamiflu Lag; Obesity; Pregnancy; Pune

Introduction

The influenza virus, known to be circulating as a pathogen in the human population since 16th century is notable for its unique ability to cause recurrent epidemics and global pandemics. Influenza (Flu) pandemics are caused by new influenza viruses in year 2009-10 have adapted to human beings and resemble major natural disasters both in terms of recurrence and magnitude.^[1] Pandemic influenza A (H1N1) 2009 has posed a serious public health challenge world-wide. In absence of reliable information on severity of the disease, the nations are unable to decide on the appropriate response against this disease.^[2]

As the 2009 H1N1 influenza outbreak evolved in North America, illness due to infection with the virus was described as mostly mild, although with a clinical spectrum comparable to seasonal influenza. With seasonal influenza, risks for complications and fatal outcome are highest for young children; adults aged 65 years, and individuals with certain chronic medical conditions.^[3] There is few data available on risk factors, severe cases and deaths associated with pandemic H1N1 influenza 2009. Estimating and interpreting case fatality ratios (CFR) is difficult, mainly due to the challenge of accurately estimating the numerator (N deaths) and the denominator (N cases) especially during a pandemic that is still evolving.^[4] In India as of 31st March 2010, there were 30917 laboratory

confirmed H1N1 positive cases out of which 1453 were deaths with positivity index of 22.87% and mortality was 4.8%. But there was alarming sign after comparing these figures with 3rd October 2010 which showed 44687 confirmed H1N1 Positive cases with 2574 deaths with rise in positivity index to 23.3% and mortality rate of 5.7%.^[5] This article aims to describe the epidemiologic characteristics of reported deaths, high-risk profiles linked with underlying disease among 80 reported deaths who died after infection with H1N1 influenza.

Materials and Methods

This retrospective hospital record-based study was carried out in the BJ Medical College & Sassoon General Hospital - a tertiary level health care setup in Pune, Maharashtra, India. Data was collected from 80 H1N1 positive deaths in predesigned format (prepared by Ministry of Health & Family welfare, Government of India) for swine flu patients admitted in identified isolation ward (IIW) for the period of 6 months from April to September 2010. The predesigned format included information such as epidemiological characteristics like age, gender, residential address, time lag for starting Tamiflu, the associated co morbidities, etc. Throat swab of patients admitted in identified isolation ward was sent for detecting H1N1 influenza by Real time polymerase chain reaction which was carried out at National Institute of virology, Pune. Trend of Occurrence of positive cases and death from April 2010 to September 2010 was drawn. The study was initiated only after the clearance from the Institutional Ethical Committee. Results were presented in the form of proportions & percentages for the respective variables. Case fatality rate was calculated for H1N1 positive deaths.

Results

There were 194 H1N1 positive cases admission from April to September 2010 out of which 80 died. The case fatality rate among H1N1 positive cases was 41%. Month wise occurrence of H1N1 positive cases and deaths showed in table no 1. There were 49 and 91 H1N1 positive cases and 23 and 34 deaths in month of July and August

respectively which showed overall rising trend in both number of H1N1 positive cases as well as deaths as shown in figure no. 1. As the number of H1N1 positive cases increased the number of H1N1 positive deaths were also increased as seen in table 2, among 80 H1N1 positive deaths 55 (68.75%) deaths were in 20 to 50 years age group. Amongst gender, 46 (57.5%) deaths were of females which was proportionately high compared to males 34 (42.5%) among H1N1 positive deaths. Out of 80 deaths, 6 (7.5%) were in the paediatric age group from 0 to 10 years of age and 13 (16.25%) deaths were in the age group of more than 50 years. Mean age among H1N1 positive mortality cases was 35.65 (\pm 15.96) years.

Table-1: Month wise Occurrence of H1N1 Positive Cases & Deaths

Month	No. of H1N1 Positive Cases	No. Of H1N1 Deaths	Case Fatality Rate (%)
April - 2010	11	4	36.3
May - 2010	12	7	58.3
June - 2010	17	4	23.5
July - 2010	49	23	47
August - 2010	91	34	37.3
September -2010	14	08	57.1
Total	194	80	41.2

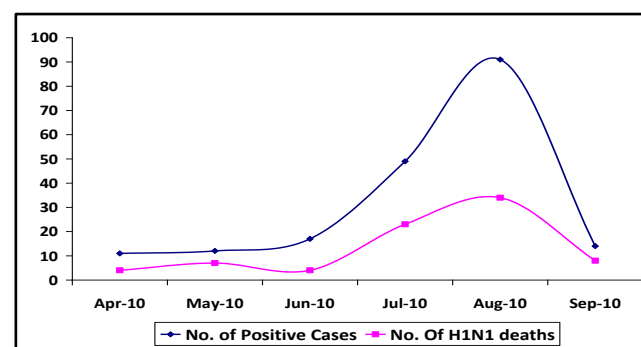


Figure-1: Trend of occurrence of H1N1 positive cases & deaths from April 2010 to September 2010

Table-2: Age & Gender wise Distribution of H1N1 Positive Cases and Deaths

Age (Yrs)	Number	Percentage
0 to \leq 5	5	6.25
5 to 10	1	1.25
10 to 20	6	7.5
20 to 30	21	26.25
30 to 40	17	21.25
40 to 50	17	21.25
> 50	13	16.25
Mean age (SD)	35.65 \pm 15.96	
Sex		
Male	34	42.5
Female	46	57.5

Distribution of H1N1 positive deaths in accordance with residential area presented in table 3 which showed that 60 (75%) deaths were in Pune district, with 31 deaths in urban and 29 in rural area. Among the other districts from where the patients were referred for treatment, Ahmednagar had 9 (11.25%) deaths, followed by Satara 6(7.50%); Solapur 3 (3.75%) and Mumbai Nasik had one death respectively.

Total number of cases admitted with H1N1 positivity was 180 out of which 100 patients were survived and rest of them died. As shown in table 2, out of 80 H1N1 positive deaths, 28 cases had co morbid conditions along with H1N1 positivity. The co morbid condition were hypertension 6 (75%) followed by diabetes 4 (57%), 2 deaths among obesity and 3 among asthmatics and 1 with epilepsy. Among H1N1 positive deaths, 12 (46%), had associated condition of pregnancy.

Time lag in receiving Oseltamivir was defined as patient who received Oseltamivir after 2 days of onset of symptoms. Total of 63 (77.7%) deaths [comprising 36(45%) in 2 – 4 days Tamiflu lag and 27(33.7%) > 5 days Tamiflu lag] had Tamiflu lag of more than 2 to 4 days. Remaining 17 (21.2%) deaths received Oseltamivir (Tamiflu) before the lag period.

Table-3: Distribution of H1N1 Positive Deaths by Residential Address

Residential Address	Number	Percentage
Pune Urban	31	38.75
Pune Rural	29	36.25
Nasik	01	1.25
Mumbai	01	1.25
Satara	06	7.50
Solapur	03	3.75
Ahmednagar	09	11.25
Total	80	100

Table-4: Comorbid Conditions among H1N1 Positive Patients Survived & Died from April 2010 to September 2010

Comorbid Conditions	Patients Died (%)	Patients Survived (%)	Total
Pregnancy	12 (46.1)	14 (53.8)	26
Hypertension	6 (75)	2 (25)	8
Diabetes	4 (57.1)	3 (42.9)	7
Asthma	3 (100)	0	3
Obesity	2(100)	0	2
Epilepsy	1 (100)	0	1
No Comorbidity	52 (35.4)	95 (64.6)	147
Total	80	114	194

Table-5: Distribution of H1N1 Positive Deaths by TamiFlu (Oseltamivir) Lag

Month	Nil	2-4 days	> 5 days
April	1	2	1
May	2	4	1
June	2	1	1
July	6	5	12
August	6	20	8
September	0	4	4
Total	17 (21.2%)	36 (45%)	27 (33.7%)

Discussion

The present study described epidemiological characteristics of 80 fatal cases admitted in Identified isolation ward of Tertiary care hospital in western India from April to September 2010. The number of H1N1 positive cases and deaths were maximal in the month of July and August because of favourable climatic condition for the transmission of H1N1 virus mainly ambient humidity and absence of dry air which helps in evaporating respiratory particles.^[7] Mortality was predominantly seen among 20 to 50 yr age group as this is working group liable to get expose and thereby getting infection and presence of associated condition increases overall severity of illness. A similar finding in the study presented by Ellen et al² stating the fatalities were among 18 to 64 year age group which is very unlikely as seen in cases with seasonal influenza. Sharma et al⁹ studied 210 confirmed H1N1 positive deaths in tertiary care teaching institution presented the similar findings regarding mean age among the deaths. It was 38 ± 15.3 in that study and 2 deaths were in the paediatric age group.

Presence of co morbid condition in H1N1 positive deaths was also persistent in the other studies. Obesity along with Diabetes, hypertension and asthma was common co morbidities in the decedents. The similar findings quoted by Ellen et al³ with 20% of deaths had obesity and asthma in 21% of cases as risk factor in H1N1 fatality. L Vaillant et al⁴ studied epidemiology of fatal cases which also showed similar findings regarding co morbid condition 57 cases had Obesity, Obesity with diabetes or Diabetes alone and 37 cases had respiratory diseases including 8 cases of asthma. Liam J Donaldson et al⁶ studied mortality among H1N1 positive deaths in England which showed obesity among 11 cases and diabetes in 9 cases.

Pregnancy was an associated condition in maximum proportion of deaths so it was also considered as risk factor in this study. Chacko J, Gagan B⁸ who studied critically ill patients with 2009 H1N1 infection in an Indian ICU stated obesity 9 (29%), hypertension 4 (12.9%) and pregnancy 3 (9.7%) were associated risk factors.

As per CDC guidelines, Tamiflu should be started within 2 days of flu symptoms and the number of deaths was more in Tamiflu lag of more than 2 days comparing with no time lag.¹⁰ Oseltamivir (Tamiflu) initiation lag was associated in almost 63 deaths compared to 17 deaths without time lag in initiating Oseltamivir. The association of certain condition had been studied in this study but further research will be required to find out causal association of these conditions with H1N1 mortality.

Conclusion

Mortality was high among the adults and overall mortality was more among females. Obesity, hypertension and pregnancy are associated risk factors for mortality among H1N1 positive cases. Lag of Oseltamivir treatment initiation within 2 days of infection was associated with high mortality. As this study focused only on patients admitted in the hospital with symptoms suggestive of H1N1 positive this was one of the limitation in this study as study group was specific. As per the findings in the present study we will like to suggest that people with co morbid conditions especially with asthma, hypertension and diabetes and associated condition like pregnancy should follow good hygienic practices like thorough hand washing, wearing mask, avoiding going into crowd and most important is to see a doctor early for clinical signs of influenza. The initiation of Tami flu is also important factor to prevent the mortality from illness.

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