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A Study of 50 Cases of Progression Complications and Outcome of Microbiologically Confirmed H1n1 Pneumonitis

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ABSTRACT: In the present paper, the H1N1-2009 swine flu strain which caused the pandemic is studied on 50 confirmed cases for complicationsand outcomes in P.D.U. Medical College during year 2018-2019. Aims and Objectives – (a) to study the clinical course, complications, and progression of H1N1 cases in response to treatment, (b) to study the outcome and prognosis of H1N1 Cases. Various complications of H1N1 infection are H1N1 pneumonitis, secondary bacterial pneumonia, exacerbation of COPD and Bronchial Asthma, ARDS, Pneumothorax, MODS, Septic encephalopathy, Myocarditis, Pericarditis, Rhabdomyolysis, Electrolyte imbalance and ABGA disorders.Majority of mortality due to H1N1 is attributed to comorbid conditions like diabetes mellitus, Hypertension, IHD, Elder age, pregnant women, Chronic kidney disease, immunocompromised conditions, COPD. Fever is most common symptom. Diabetes mellitus is common comorbidity associated with complication. Respiratory conditions like COPD were less commonly associated with mortality as compared to Diabetes Mellitus & Hypertension.

Keywords: H1N1, Swine-flu, Influenza, Pneumonitis.

I. INTRODUCTION

The "2009 swine flu" strain that originate in Mexico was named as Novel H1N1 flu since it was mainly found infecting humans. The influenza A and B viruses that routinely spread in people are responsible for seasonal flu epidemics each year. The term influenza represents both a clinically defined respiratory illness accompanied by systemic symptoms of fever, malaise, and myalgia and the name of Orthomyxoviridae that cause this syndrome. There are three serotypes of Influenza viruses A, B & C. Influenza A and C infect multiple species while B infect human almost exclusively. Type A viruses appear to be most virulent for humans and most commonly cause severe disease manifestations. Large amounts of influenza virus are often present in respiratory secretions of infected persons. As a result, infection can be transmitted through sneezing and coughing and is thought to be via both large droplets and small particles aerosols.[1]

P.D.U Medical College and Civil Hospital Rajkot is the tertiary care hospital among 4-5 districts of Saurasthra. We retrospectively studied the progression, complications and outcome of Microbiologically confirmed H1N1 pneumonitis during the year 2018-2019.

The exact timing of the onset, peak, and the end of influenza activity vary and cannot be predicted precisely from one season to the next. In general, however, annual epidemics of influenza typically occur during fall and winter. Influenza activity often begins to increase during October and can extend as late as may. Peak activity most commonly occurs during winter. The typical incubation period for influenza is one to four days (average two days). The time between onset of illness among household contacts among whom transmission has occurred (termed the serial interval) is three to four days.[6]Majority of mortality due to H1N1 is attributed to comorbid conditions like diabetes mellitus, Hypertension, IHD, Elder age, pregnant women, Chronic kidney disease, immunocompromised conditions, COPD. Initiation of these potentially pandemic illnesses have occurred with individuals who have had direct contact with domesticated birds or who have visited live bird markets which are common in Asia.

In March 2009, an outbreak of respiratory illnesses was first noted in Mexico, which was eventually identified as being related to a novel H1N1 influenza A virus. The outbreak spread rapidly throughout the world as a result of airline travel. In June 2009, the World Health Organization (WHO) raised its pandemic alert level to the highest level, phase 6, indicating widespread community transmission on at least two continents[2]

The pandemic was declared to be over in August 2010. The pandemic H1N1 virus has

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continued to circulate since then. The pandemic was caused by an H1N1 influenza A virus that represented a quadruple reassortment of two swine strains, one human strain, and one avian strain; the largest proportion of genes came from swine influenza viruses. During the 2009 to 2010 H1N1 influenza A pandemic, over 99 percent of subtyped influenza [3]

On the basis of antibody response, Influenza A viruses can be subdivided into 18 different hemagglutinin (H) surface protein subtypes and 11 neuraminidase (N) surface protein subtypes. The subtypes that cause major pandemics are H1N1, which caused 1918 pandemic; H2N2, which caused the 1957 pandemic; H3N2 which caused the 1968 pandemic.

II. CASE DEFINITIONS

The following case definitions have been provided by the United States Centers for Disease Control and Prevention:

1. Influenza-like illness (IL1) is defined as fever with cough or sore throat in the absence of known cause other than influenza [4]
2. A confirmed case of pandemic H1N1 influenza A is defined as an individual with an laboratory-confirmed H1N1 influenza A virus detected by real-time reverse transcriptase (rRt)-PCR or culture [5]
3. Pandemic H1N1 influenza A may be suspected in an individual who does not meet the definition of confirmed pandemic H1N1 influenza A, but has an IL1 and an epidemiologic link.

III. COMPLICATIONS OF INFLUENZA

The complications of influenza are as follows:

1) Pneumonia is the most common complication
2) Acute respiratory distress syndrome and multisystem organ failure
3) Myositis and rhabdomyolysis
4) Cardiac complications-Acute MI, myocarditis, pericarditis
5) Neurological complications-encephalopathy, encephalitis

transverse myelitis, aseptic meningitis, and Guillain-Barré syndrome.

6) Toxic shock syndrome

IV. MATERIAL & METHOD

A group of 50 H1NI microbiologically positive patients admitted in Swine Flu Ward, P.D.U Medical College & Hospital, Rajkot during the time period of September 2018 to November 2019 were included in the study with the help of hospital case records.

a. Inclusion Criteria

- Microbiologically confirmed cases of H1N1
- Patients having radiological evidence of lower respiratory tract involvement
- Patients have age > 14 years

b. Exclusion Criteria

- Pregnant Female

c. Confirmation of Influenza

- It was done RT-PCR testing in P.D.U Medical college, MicrobiologyDepartment.

d. Study Pattern

- Cross sectional study
- Observational Study

A hospital based cross sectional study was conducted in P.D.U Medical College & Hospital Rajkot from swine flu ward September 2018 to November 2019.

- All the cases were RT PCR confirmed at P.D.U Medical College, Microbiology department. The study has an ethical clearance from institutional ethical committee.
- The total number of 50 H1N1 microbiologically confirmed cases of Pneumonitis from swine flu ward, P.D.U Medical College & Hospital were studied during this period of 12 months.
- During this period the clinical profile of H1N1 cases were analysed with reference to age distribution, sex distribution, clinical manifestations, risk factors, progression, complications etc.
- Detail physical examination & other investigation like complete blood count, renal function test, chest x ray, ABGA was done for all patients

V. PROGRESSION & COMPLICATIONS WILL BE EVALUATED IN TERMS OF FOLLOWING PARAMETERS

- Use of Mechanical Ventilation
- Peripheral capillary oxygen saturation(spO2)
- Use of inotropes & vasopressors
- Use of anticoagulation
- Development of Septicemia
- Development of Pneumothorax
- Development of Acute Coronary event
- Use of higher antibiotic

a. Clinical Manifestation

In our study, the most common symptom was Fever (98%) followed by Breathlessness (94%). The high incidence of breathlessness in our study as compared to other studies is because of the

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fact that our study has included only H1N1 Pneumonitis cases whilemajority of other studies were done on H1N1 cases included both upper respiratory tract & lower respiratory tract involvement. (Refer **Table 1**)

b. Vital Signs

In the present study, out of 50 patients, 96% were having tachypnoea and out of this 52% patients were having hospital stay of >1 week and recovered. While 6% were having hospital stay <1 week and recovered and 38% patients died irrespective of hospital stay. While fever was present in 98% patients out of this 50% had hospital stay >1 week and recovered and 10% had hospital stay <1 week and recovered and 38% died irrespective of hospital stay.

On the other hand, tachycardia was present was present in 80% of patients, out of which 38% had hospital stay >1 week and recovered while 10%had hospital stay <1 week and recovered and 32% patients died irrespective of hospital stay. (Refer **Table 2**)

c. Age Distributions

The number of mortality as well as Duration of hospital stay > 1 week increases after the age group of 40 year.There was bimodal age of distribution for mortality.

1. In patients > 60 year (63.63 % patient died in this age group; 7 i.e., out of 11patient died)
2. In patients 41-50 year (37.5 % patient died in this age group;i.e., 6 out of 16 patients died)

Majority of patients had hospital stay > 1 week that increases the overall economic burden on our government hospital. This is because majority of patients requiring hospitalization were greater than 40 year in our study. (Refer **Table 3**)

d. Gender Distribution

Overall mortality was more in the male group (40% i.e., 13 out of 30 patients) as compared to female group (31.57% i.e. 6 out of 19 patients). (Refer **Table 4**)

e. Complications during hospital stay.

Most common complication observed during the study was Acidosis (pH <7.35) (Total no. 36) followed by ARDS (total no. 30) & Secondary Bacterial pneumoniae (total no. 22). (Refer **Table 5**)

- We noticed that majority of patient that recovered have hospital stay> 1 week once any of the above complication occurred.
- We observed that all the 4 patient who developed AKI succumbs to death (100%).
- Out of 16 patients with MODS, mortality was present in 12patient (75%).Similarly, 6 patients (75%) out of total 8 patients who developed septic shock died during their course of illness.While in ARDS, 60% (18 out of 30) faced mortalityduring their course of illness.While in ARDS, 60% (18 out of 30) faced mortality.

f. Comorbidities

- In our study, Diabetes mellitus (total no 13) was the most common comorbidity present. Diabetes Mellitus was closely followed by hypertension (total no 12) in our list.
- All the patients in Diabetes Mellitus, Hypertension & Ischemic heart disease patient developed arterial saturation < 90%.
- Proportionately significant number of multilobar infiltrates on chest x ray was present in the above mentioned three groups.
- All the 8 patients in Ischemic heart disease group developed ARDS.
- Mechanical Ventilation in the form of invasive or non-invasive was used in 11 out of 12 hypertensive patients followed by Ischemic heart disease. (7 out of 8) (Refer **Table 6**)

g. Outcome in Smokers versus Non-Smokers

- The mortality rate was high in smokers' group. 9 out of 19 patients (47.36%) died.
- This rate was 32.22% in non-smokers. (Refer **Table 7**)

VI. DISCUSSION

A case series of H1N1 influenza done by Dr A.Puvalingam,Madras in a total of 442 cases was done.In our study, the most common symptom was Fever (98%) whereas 95.45% in our case.[7] Breathlessness (94%) was present in our study whereas only in 32.82% in their study. The high incidence of breathlessness in our study as compared to Case series on swine flu, madras 2012 is because of the fact that our study has included only H1N1 Pneumonitis cases while Case series on swine flu, madras 2012 was done on H1N1 cases included both upper respiratory tract & lower respiratory tract involvement. Madras Study included both paediatric & adult population while our study solely consists of adult population

a. Vital Signs Association in Various Study Groups

ShyamMathur et al study shows that 69% of the swine flu positive patient have tachypnoea out of 122 cases.[8] In present study 96% of swine flu positive patients have tachypnoea out of 50 cases.

b. Complications of H1N1 pneumonitis in various studies

Complications like Acidosis(72%),ARDS(60%), Secondary bacterial pneumonia(44%),MODS(32%) AKI(8%)was studied. The higher rate of complications in our study as compared to Study on H1N1 Influenza A at tertiary care centre in Hyderabad, Telangana was due to the fact that all of our cases were hospitalized cases & thus Pneumonitis while that in Telangana study only minority of cases were having pneumonitis. The higher mortality in our setup was also due to delayed referral of cases from taluka level.

The most common complication observed was Acidosis followed by ARDS. Highest mortality rate observed were in Acute Renal Failure group (all the 4 patients in this group succumb) but this confounded by the fact that only 4 patients with Acute Renal Failure were there. So, to generalized this finding a greater number of cases will be needed. Next in the line was MODS showing 75% mortality. Similar observation was seen in other studies.

VII. CONCLUSION

Based on the above analysis, it can be concluded that, (i) The most common symptom was fever followed by breathlessness. (ii)There were Bimodal age of distribution for mortality. (iii) 1st peak in age group > 60 years followed by 2nd peak in age group 41-50 years. (iv)Overall Mortality was higher in male as compared to female. (v) Most common complication observed was Acidosis followed by ARDS & Secondary Bacterial Pneumonia. (vi) Mortality was present in 75% of patient who developed MODS.(vii) Most common comorbidity observed was Diabetes Mellitus followed by Hypertension. (viii) Respiratory conditions like COPD were less commonly associated with mortality as compared to Diabetes Mellitus & Hypertension. (ix) Mortality was highest in Ischemic Heart Disease patients. (x) 40% patients were smokers in our study. Overall Mortality was higher in smokers as compared to non-smokers.

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Table 1 – Clinical Manifestation

SYMPTOMS	PERCENT	SYMPTOMS	PERCENT
1)FEVER	98%	2)BREATHLESSNESS	94%
3)COUGH	86%	4)BODYACHE	36%
5) HEADACHE	32%	6)EXPECTORATIONS	28%
7)SORETHROAT	26%	8)DIARRHOEA	22%
9)CHEST PAIN	18%	10)NASAL DISCHARGE	16%
11)ALTERED SENSORIUM	04%	12)OLIGURIA	02%

Table 2 – Vital Signs

VITAL SIGNS	DURATION OF HOSPITAL STAY < 1 WEEK & RECOVERED	DURATION OF HOSPITAL STAY > 1 WEEK & RECOVERED	DEATH IRRESPECTIVE OF HOSPITAL STAY	TOTAL NUMBER
1)TACHYPNOEA	6%	52%	38%	96%
2)TACHYCARDIA	10%	38%	32%	80%
3)FEVER	10%	50%	38%	98%

Table 3 – Age distribution

AGE (in year)	DURATION OF HOSPITAL STAY < 1 WEEK & RECOVERED	DURATION OF HOSPITAL STAY > 1 WEEK & RECOVERED	DEATH IRRESPECTIVE OF HOSPITAL STAY
10 -20	02	01	00
21-30	01	01	01
31-40	02	04	02
41-50	00	10	06
51-60	00	06	03
>60	00	05	07

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Table 4 – Gender distribution

	DURATION OF HOSPITAL STAY < 1 WEEK & RECOVERED	DURATION OF HOSPITAL STAY > 1 WEEK & RECOVERED	DEATH IRRESPECTIVE OF HOSPITAL STAY
MALE	3	15	13
FEMALE	2	11	6

Table 5 – Complications during hospital stay

COMPLICATIONS	DURATION OF HOSPITAL STAY < 1 WEEK & RECOVERED	DURATION OF HOSPITAL STAY > 1 WEEK & RECOVERED	DEATH IRRESPECTIVE OF HOSPITAL STAY	TOTAL
ACIDOSIS	00	18	18	36
ARDS	00	12	18	30
SECONDARY BACTERIAL PNEUMONIA	01	07	14	22
ALTERED ELECTROLYTES	02	12	07	21
MODS	00	04	12	16
SEPTIC SHOCK	00	02	06	08
ACS	00	02	03	05
ACUTE KIDNEY INJURY	00	00	04	04
PNEUMOTHORAX	00	00	01	01

Table 6 – Comorbidities

COMORBIDITIES	ARTERIAL SATURATION < 90%	MULTILOBAR INFILTRATES ON CHEST X RAY	DEVELOPMENT OF ARDS	USE OF MECHANICAL VENTILATION	TOTAL NO & PERCENT OF CASES
DIABETES MELLITUS	13	12	07	10	13(26%)
HYPERTENSION	12	12	08	11	12(24%)
ISCHEMIC HEART DISEASE	08	08	08	07	08(16%)
COPD	05	05	04	05	08(16%)
PULMONARY KOCH'S (ACTIVE OR OLD)	02	02	02	02	02(4%)

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Table 7 – Outcome of Smokers versus Non-Smokers

	DURATION OF HOSPITAL STAY < 1 WEEK & RECOVERED	DURATION OF HOSPITAL STAY > 1 WEEK & RECOVERED	DEATH IRRESPECTIVE OF HOSPITAL STAY	TOTAL NUMBER OF CASES
SMOKERS	2	8	9	19
NON-SMOKERS	3	18	10	31