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Original Research Article

Mortality profile of confirmed cases of swine flu attending a tertiary care center of Udaipur region of Rajasthan, India

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ABSTRACT

Background: Mortality profile is an analytical tool used to identify the various factors responsible for poor outcome of disease and it can also use to evaluate quality and efficiency of healthcare providers. The aim of this study is to summarise the clinical and epidemiological factors as well as to identify the risk factors associated with mortality among swine flu cases.
Methods: It is a cross-sectional, descriptive, hospital-based study conducted on 62 deceased patients due to swine flu reported at Maharana Bhupal Government Hospital, Udaipur, Rajasthan during the outbreak of influenza A H1N1 in the year 2015. A standardized pre-structured questionnaire with consent was filled by help of bed head tickets and by interview of attendants of deceased patients.
Results: Deaths were higher among age group of 31-45 years (35.48%). Case fatality rate for male patients (13.88%) was higher. Mortality was highest in females of rural background 27(43.55%). Majority of deceased patients (70.97%) had delay of 4-7 days in admission after onset of symptoms. Diabetes, cardiovascular diseases and pregnancy was the major risk factors for poor outcome.
Conclusions: Delay in diagnosis and admission may be the reason for higher mortality rate. The most common co morbid illness was Diabetes mellitus, cardiovascular diseases (Ischemic heart disease, Rheumatic heart disease, Hypertension) and pregnancy.

Keywords: Co-morbid illness, Influenza A H1N1, Mortality profile, Rajasthan outbreak, Swine flu

INTRODUCTION

Swine flu is an acute respiratory tract infection caused by influenza A H1N1 which is characterized by chills, fever, sore throat, muscle pains, severe headache, coughing, weakness/fatigue and general discomfort. In more serious cases, influenza causes pneumonia, which can be fatal, particularly in the elderly and patients with pre-existing illness.[1] Influenza spreads around the world in seasonal epidemics, resulting in the deaths of between 250,000 and 500,000 people every year, up to millions people affected in some pandemic years. In the United States average around 41,400 people died per year during various epidemics of influenza between 1979 and 2001.[2]

The pandemic influenza A (H1N1) started in southern part of Rajasthan in August 2009 and lasted until November 2010. A large number of H1N1 cases and deaths have been reported during this pandemic.[3] After that, in next two years till August 2012, Southern Rajasthan reported little influenza activity. In September 2012, this influenza A H1N1 virus once again has resurfaced in this region of India. The number of new cases, including fatal cases continues to increase since 13th September 2012 in Southern Rajasthan, Jaipur. It

lasted till 28th February 2013.[4] Swine flu cases again resurfaced in month of January 2015 in Southern region of India. First death reported on 2nd February 2015. Swine flu positivity continues to increase with peak in the month of February and March 2015. Recently sudden outbreak of swine flu was more severe with high mortality and morbidity in compare to that of year 2012. Epidemic was declared on 12th February 2015 in Rajasthan which declared end on 15 April 2015, however screening of patients of influenza like illness was continue in swine flu OPD and infrequent cases of swine flu were found positive. 491(39.37%) patients were found positive for H1N1 and 62 were expired during this period.

Mortality profile is an analytical tool used to identify the various factors responsible for poor outcome of disease and it can also use to evaluate quality and efficiency of healthcare providers. The aim of this study is to summaries the clinical and epidemiological factors as well as to identify the risk factors associated with mortality among swine flu cases.

METHODS

A retrospective, descriptive, hospital-based study. The study was conducted during the outbreak of Influenza A H1N1 for one year (January 2015 to December 2015) at Maharana Bhupal Government Hospital, Udaipur, Rajasthan, India. Study population included 491 swine positive patients and 62 deceased patients due to swine flu.

Inclusion criteria

- All the patients found positive for H1N1 by rt-PCR and the patients expired due to swine flu were included in study.

Exclusion criteria

- Patients who were found negative for H1N1 by rt-PCR were excluded from the study.

During the swine flu outbreak in year 2015 all suspected patients were tested for swine flu by using reverse transcriptase polymerase chain reaction test (rt-PCR). A total about 491 patients were found to be swine positive was 491(39.37%), out of them 62 (12.63%) were expired. A standardized pre-structured questionnaire with consent was filled by help of bed head tickets and by interview of attendants of deceased patients. The questionnaire included clinical and epidemiological data of patients like age, sex, residence, communication detail, clinical signs and symptoms, exposure history, type and numbers of sample collected, time of report received, treatment taken, co-morbid medical conditions, investigation reports and duration of hospitalization. Ethical clearance from ethical committee has been obtained prior to beginning of study.

Statistical analysis

The data obtained by study was entered into excel sheet and statistical analysis was done using statistical software SPSS 21. Chi square test and Mann Whitney U test were used for statistical analysis. The results are depicted in the form of tables.

RESULTS

Table 1 shows that overall case fatality rate was 12.63%. It was observed that case fatality rate for male patients (13.88%) were higher than that for female patients (11.70%) however this difference was not significant (p>0.05).

Table 1: Comparison of case fatality rate of confirmed patients (n= 491).

Sex	Swine positive patients (n=491)	Survived patients (n=429)	Survival Rate	Death (n=62)	Case fatality rate
Male	209	180	86.12%	29	13.88%
Female	282	249	88.30%	33	11.70%
Total	491	429	87.37%	62	12.63%

Chi square 0.514, p value 0.473 (statistically not significant)

Table 2: Age wise distribution of expired patients (n=62).

Age group	Swine positive patients (n=491)	Survived patients (n=429)	Survival rate	Expired patients (n=62)	Case fatality rate
0-15 years	19	18	94.74%	1	5.26%
15-30 years	147	132	89.80%	15	10.20%
31-45 years	137	115	83.94%	22	16.06%
46-60 years	134	117	87.31%	17	12.69%
60 years and above	54	47	87.04%	7	12.96%
Total	491	429	87.37%	62	12.63%

Table 2 shows that majority of patients 22 (35.48%) expired to swine flu belonged to age group of 31-45 years and the case fatality rate (16.06%) is also highest for this age group but this difference was statistically significant (p<0.05).

Table 3: Sex and area wise distribution of expired patients (n=62).

Sex	Area		Total
	Rural	Urban	
Male	19 (30.65%)	10 (16.13%)	29
Female	27 (43.55%)	6 (9.68%)	33
Total	46 (74.19%)	16 (25.81)	62

Table 3 shows that majority of deceased patients 46(74.19%) were belonged to rural background. Mortality during swine flu outbreak was highest in females of rural background 27(43.55%) but this difference was not significant (p>0.05).

Table 4: Turnaround time (Time lag between appearances of symptom to diagnosis) in survived and deceased patients.

Turn around time	Survived patients n (%)	Deceased patients n (%)
≤3 Days	150 (34.96)	4 (6.45)
4-7 Days	231 (53.85)	37 (59.68)
>7 Days	48 (11.19)	21 (33.87)
Total	429 (100)	62 (100)

Chi square 34.211, p value <0.05 (statistically significant).

Table 4 shows the duration between time of onset of symptoms to diagnosis among survived and deceased patients. There was a difference which is statistically significant.

Table 5: Duration of illness (Time lag between appearances of symptoms to hospitalization) in deceased patients.

Time lag to hospitalization (in days)	Number of patients (n=62)	Percentage
≤3 Days	1	1.61
4-7 Days	44	70.97
>7 Days	17	27.42
Total	62	100.00

Table 5 shows that majority of deceased patients 44 (70.97%) had delay of 4-7 days in admission after onset of symptoms. In present study mean delay in hospitalization from onset of symptoms were observed to be 6.73±2.33 days and the median delay was 6.5 days (range 2-20).

Table 6 shows that majority of patients 42(67.74%) were expired within 3 days of hospitalization.

Table 6: Duration of hospitalization in deceased patients.

Duration of hospitalization	No. of expired patients (N=62)	Percentage
≤3 days	42	67.74
4-7 days	18	29.03
>7 days	2	3.23
Total	62	100

Table 7 shows that the patients with predisposing factors among cured patients were 46 (10.72%) while among expired cases were 25 (40.32%) and this difference was statistically significant (p<0.0001).

Table 7: Association of mortality with predisposing risk factors.

Predisposing risk factors	Cured (%)	Expired (%)	Total
Yes	46 (10.72)	25 (40.32)	71
No	383 (89.28)	37 (59.68)	420
Total	429 (100.00)	62 (100.00)	491

Chi square 38.371, df=1, p value <0.0001 (Statistically significant).

Table 8 shows that majority of patients 37(59.68%) were expired with no risk factors. Diabetes mellitus 8 (12.90%) was the most common predisposing factors followed by cardiac risk factors 7 (11.29%) and pregnancy/postpartum period 7 (11.29%).

Table 8: The causes of death.

Risk groups	No. of expired patients (N=62)	(%)
No risk factors	37	59.68
Pregnancy/postpartum period	7	11.29
Diabetes mellitus	8	12.90
Respiratory disorder/ COPD/T.B.	5	8.06
Cardiac disorders/HTN	7	11.29
Renal diseases	2	3.23
Neurological disorders	1	1.61
Others- Anaemia, Malaria, PLHA, psoriasis	4	6.45
Multiple risk factors	5	8.06
Old age >65 years	5	8.06

DISCUSSION

In present study overall case fatality rate was 12.63%. Present study reported higher CFR in compare to the study of Chowell G et al, which reported overall CFR 1.2% and highest (5.5%) among people over 60 years.[5] In present study CFR for age group 31-45 years (16.06%) were highest which is comparable with the study finding of Singh M et al, at Jodhpur, Rajasthan, India which

stated that highest CFR (20.2%) in the age group of 15-45 years.[4] In contrast to an inception-cohort study conducted by Steven AR et al, in all Australian and New Zealand intensive care units (ICUs) during the winter of 2009 which reported case fatality rate 14.3%, present study reported slightly lower CFR (12.63%).[6] Our findings were corroborating to a study of Sharma et al, CP reported slightly higher CFR among males (10.2%) than females (9.2%).[3] Our findings were also corroborating to findings of study of Patel PB et al, which reported slightly higher CFR among males (6.0%) than females (5.8%) and the difference was not statistically significant.[7] Present study reported higher overall CFR and affected male population.

In present study mortality in the age group of 31-45 years was found to be highest 35.48% (22 cases). In contrast to study of Singh M et al, at Jodhpur, Rajasthan, India this showed 22.4% (13) deaths in the 30 to 45 year age group.[4] In study conducted by Sharma CP et al, during 2009-2010 in same study area revealed maximum number of deaths 58.6% were reported in 21-40 year age group.[3] Our findings were corroborating with the study findings of Nandimath VA et al, which reported that highest mortality (50.00%) were observed in 31-45 years age group.[8] Our findings were also contrary to study of Jadawala H et al, which reported highest number of deceased patients (43%) belonged to age group between 40-60 years.[9] Present study findings are in contrast with the study of Vasanthi T et al, which showed that case fatality was high in the age group greater than 65 years.[10] Present study findings are in contrast with the study of Domadia K et al, which showed that maximum mortality was found in the age group greater than 60 years (29.62%).[11] The higher mortality in Southern Rajasthan, India region as compare to other regions of country may be due to the fact that the study was restricted to a small geographical area when compared to the entire country and sick patients were referred from the adjacent tribal regions and nearby states which have poor medical infrastructure which consequently led to loss of crucial delay in primary treatment.

Present study reported that majority of deceased patients 46(74.19%) belong to rural background. Mortality during swine flu outbreak was highest in females of rural background 27(43.55%). It coincides with the study conducted by Sharma CP et al, which showed that death were more in the cases belong to rural areas (58.6%) and rural females (52.8%).[3] Our findings corroborates with the study of Vyas C et al, which reported that death among females (34.2%) was higher than males (22.7%) in pandemic period.[12] Our findings were also contrary to study of Jadawala H et al, which reported that deaths were almost equally distributed among male and female.[9] Present study findings corroborates with the study of Domadia K et al, which reported that more mortality was seen in females (24.28%) compared to males (19.70%).[11] Reason of more swine flu morbidity and mortality in rural population might be lack of knowledge of preventive measures and delayed availability of treatment facilities.

Present study reported that majority of expired patients 37(59.68%) were diagnosed within 4-7 days of onset of symptoms while majority of survived patients (38.90%) were diagnosed within 4-5 days of onset of symptoms. Delayed treatment seeking behaviors shows lack of knowledge and awareness.

In present study delay in hospitalization from onset of symptoms was observed median 6.5 days (range 2-20). Our findings corroborate with the study of Perez-Padilla R et al, which reported delay in hospitalization from onset of symptoms was median 6 days (range 4-13).[13] In the study of Vyas C et al, delay in hospitalization was much lower during pandemic period (4.6±1.7 days) while equivalent during post-pandemic period (6.3±2.5 days) in compare to present study.[12] Present study reported that majority of expired patients 44 (70.97%) had delay of 4-7 days in admission after onset of symptoms. Our finding was similar to study of Jadawala H et al, which reported that majority of expired patients (57.4%) has delay of more than 2 days in admission from onset of symptoms.[9]

Present study reported that majority of patients 42(67.74%) were expired within 3 days of hospitalization. Present study finding corroborates with the study of Nandimath VA et al, which reported that majority of patients 9 (75.00%) were expired within 2 days of hospitalization.[8] In present study median duration of hospital stay in expired patients was 2 days (range 0-8) which is much lower than the study of Perez-Padilla R et al, which reported duration of hospitalization in expired patients was median 9 days (range 4-18).[13] Present study reported that median duration from onset of symptoms to death was 9 days (range 4-24) which is much lower than the study of Perez-Padilla R et al, which reported median duration from onset of symptoms to death was 14 days (range 10-23).[13] In present study mean duration of hospital stay in expired patients was 2.71±2.07 days which is much lower than the study of Domadia K et al, which reported mean duration of hospitalization in expired patients was 9.9 days. It shows that the progression of disease was rapid in present outbreak.[11]

Present study reported the significant association of predisposing factors with expired cases in compare to survived and this finding corroborated with the study findings of Nandimath VA et al.[8] In present study majority of expired patients 37(59.68%) were not having any risk factor. Among expired patients' pregnancy (11.29%), diabetes mellitus (12.90%) and hypertension (11.29%) were most common risk factors. In contrast to our findings the study of Nandimath VA et al, reported that majority of expired patients 9 (75.00%) were having any risk factor while hypertension and diabetes were most common risk factors similar to present study.[8] In contrast to our findings the study of Sharma CP et al, reported that high risk factors were present in majority

(79.31%) of expired patients while pregnancy (27.5%) was most common followed by diabetes mellitus (17.2%) similar to present study.[3] Present study findings corroborates with the study of Malkar VR et al, which showed that majority of patients 36(60.00%) were not having any risk factor.[14] Study findings of Kashinkunti MD et al, reported that diabetes (50%) and hypertension (45.5%) are most common risk factors.[15] In contrary to present study findings the study of Jadawala H et al, reported that out of 47 patients, 26 (55.3%) had high risk factors (like hypertension, diabetes, ischemic heart disease, thyroid disorder, liver disorder, seizures, malignancy, pregnancy) in which hypertension (25.5%) was most common.[9]

CONCLUSION

By this study authors can conclude that case fatality rate for male patients (13.88%) was higher than that of female patients (11.70%). Majority of patients 22 (35.48%) expired to swine flu belong to age group of 31-45 years. Majority of deceased patients 46 (74.19%) belong to rural background. Majority of deceased patients 44 (70.97%) had delay of 4-7 days in admission after onset of symptoms. Median delay and mean delay were observed 6.5 days (range 2-20) and 6.73±2.33 respectively. Majority of deceased patients 37 (59.68%) were diagnosed within 4-7 days of onset of symptoms and majority of patients 42(67.74%) were expired within 3 days of hospitalization. Predisposing risk factors are associated with mortality. The most common co morbid illness was diabetes mellitus, cardiovascular diseases (Ischemic heart disease, rheumatic heart disease, hypertension) and pregnancy.

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