Study of H1N1 cases admitted at tertiary care hospital with special reference to neutrophil–lymphocyte ratio and lymphocyte–monocyte ratio as a screening tool for suspected H1N1

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Abstract

Background: Influenza A (H1N1) infection has been causing significant morbidity and mortality since 2009 epidemic all over the world. There needs to be rapid isolation of suspected patient to prevent further spread. Real-time polymerase chain reaction is a time consuming and costly test to confirm the diagnosis. There is a need of rapid and simple diagnostic test for H1N1.

Objective: The study was done to evaluate the utility of neutrophil–lymphocyte ratio and lymphocyte–monocyte ratio as screening tool for suspected H1N1 cases.

Material and Methods: This was a retrospective study in which confirmed H1N1 cases from isolation ward for influenza were identified. Data were recorded in validated case record form. All the data regarding clinical history, examination findings, X-ray, and blood count were collected from case records of patients. Negative H1N1 cases were excluded from the study.

Result: Mean age of patients was 27.7 year. Mean duration of stay was 5.85 days with range of 3–8 days. The most common symptoms were cough and sore throat (79.41%), fever (76.47%), and breathlessness (47.05%). Low WBC count was observed only in two patients (5.88%) Polymorphonuclear predominance was observed in 21 patients (61.76%). Polymorphonuclear to lymphocyte ratio was >2 in 21 patients and lymphocyte-to-monocyte ratio was observed >2 in 33 patients.

Conclusion: P–L ratio and L–M ratio cannot be used as criteria of exclusion of H1N1 infection because of higher prevalence of secondary bacterial infection. This needs to be further evaluated in larger patient population.

KEY WORDS: Polymorphonuclear-to-lymphocyte ratio, lymphocyte-to-monocyte ratio, RT-PCR, H1N1

Introduction

Influenza A (H1N1) pandemic was started in March 2009 in Mexico and spread over 70 countries in 7 weeks time only.

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Influenza A (H1N1), which is in post-pandemic phase and behaves like seasonal influenza, causes waves at regular frequency with resultant morbidity and mortality in susceptible population. From 2009 to 2014, total 3688 cases and 776 deaths were observed in Gujarat,[1] India. Important clinical features of influenza include fever and upper respiratory symptoms such as cough, fever, and sore throat. Headache, body ache, running nose, fatigue, abdominal pain, diarrhea, and vomiting have also been observed.[2–4] Usually reverse transcriptase polymerase chain reaction (RT-PCR) and throat swab culture are done, which are time consuming and costly procedures and result in significant delay in confirmation of suspected cases and their isolation. There needs to be

a rapid and cost-effective investigation to rapidly identify influenza A (H1N1) cases from seasonal flue so that patients can be rapidly isolated and further spread of virus can be prevented. Most of the research in influenza A(H1N1) is targeted toward characterizing symptomatology and management aspect of the disease. There are very few studies that have tried to find out investigations that can be rapidly performed, cost effective, and can easily identify patient of influenza A from seasonal flue. The effectiveness of polymorphonu-clear-to-lymphocyte ratio[5] and lymphocyte-to-monocyte ratio[6] as a cost-effective and rapid screening tool for suspected H1N1 cases have been proved in few studies.[7]

With these backgrounds, our primary objective is to review the effectiveness of polymorphonuclear-to-lymphocyte ratio and lymphocyte-to-monocyte ratio as a tool to suspect or exclude H1N1 cases. Secondary objective of this study is to characterize the morbidity and mortality pattern of swine flu positive cases (Category C)[8] admitted at tertiary hospital in Ahmadabad during the period of February and March 2015.

Material and Method

This was a retrospective study done at a tertiary care hospital in Ahmedabad, Gujrat, India. Ethical clearance was obtained from institutional ethical review board. Our hospital has facility of isolation facility for suspected influenza A (H1N1) patients. Data of patients were recorded in pre validated case record form.

Inclusion criteria included patients who were admitted in isolation ward for influenza like illness. Only H1N1 (Category c)-infected patients who were confirmed by RT-PCR were included in this study irrespective of age or gender.[7] Exclusion criteria are patients with H1N1 negative by RT-PCR.

All the data regarding clinical history, examination findings, X-ray, and blood count were collected from case records of patients. Blood counts were done on five part fully automated counter machine (sysmexI) and were verified by pathologist. X-rays were reviewed by radiologist. Leukocyte counts were interpreted according to recommendation.[8]

Results

The study population included 34 patients. The mean age was 27.7 year with range of (6 month to 67 years). More than 38.23% were aged 15–30 years and 32.35% patients were 30–65 years of age following the worldwide trends.[4–6]

Out of 34 patients, 15 (44.2%) were male and 19 (55.8%) were female. Mean duration of stay was 5.85 days with range of 3–8 days. Out of 34 patients, 3 patients expired. A 28-year-old pregnant lady, with 2 days short history presented with ARDS expired on the same day; the second was a 58-year-old female having ARDS with pulmonary edema expired on third day after admission; and the third was a

55-year-old male having septicemia with ARDS with shock expired on second day of admission. Five patients (14.70%) having underlying co-morbid (two patients having hypertension, two patients having diabetes, and two patients having asthma) condition require hospitalization for more than seven days. Twenty-six patients (76.47%) were discharged within seven days of hospitalization.

The most common symptoms were cough and sore throat (79.41%), fever (76.47%), and breathlessness (47.05%). Headache (11.76%), vomiting (14.70%), and diarrhea (5.40%) were other symptoms reported.

Out of 34 patients, 14 patients (41.17%) were having radiological lesions most common finding was consolidation (26.47%). Effusion was observed in only one patient, which was associated with consolidation. Interstitial pneumonitis was observed in two patients and bronchopneumonia in three patients.

Pneumothorax was not observed in any patients.

Out of 34 patients, 13 (38.23%) were having high WBC count and 19 patients (55.88%) were having normal WBC count. Low WBC count was observed only in two patients (5.88%). Polymorphonuclear predominance was observed in 21 patients (61.76%). Polymorphonuclear-to-lymphocyte ratio was >2 in 21 patients and lymphocyte-to-monocyte ratio was observed >2 in 33 patients.

Comorbid conditions observed were hypertension, diabetes, and asthma. Jaundice and hyperthyroidism were observed in two patients. Two patients of asthma, two patients of diabetes, and one patient of hypertension required hospitalization for more than 7 days. Hypertension and diabetes were the comorbid condition observed in two expired patients.

Discussion

More than 38.23% were aged 15–30 years and 32.35% patients were 30–65 years of age following the worldwide trends.[4–6]

The most common symptoms were cough and sore throat (79.41%), fever (76.47%), and breathlessness (47.05%). Headache (11.76%), vomiting (14.70%), and diarrhea (5.40%) were not the common presenting symptoms. Same findings were observed by other researchers.[2–4]

As observed by other researches, P–L ratio < 2[3] and L–M ratio <2[4] were indicator of suspected H1N1 infection, in this study, polymorphonuclear predominance and P–L ratio >2 were observed in 61.76 % H1N1 positive patients, which suggest the presence of secondary bacterial infection. L–M ratio <2 was observed in one patient. This study included only Category-C patients admitted in hospital, Category-A and B-patients were not tested by RT-PCR so they were not included in this study. It is possible that P–L ratio and L–M ratio <2 may be present in uncomplicated H1N1 infection as seen in other studies. But, it cannot be used as criteria of exclusion of H1N1 infection because of high prevalence of
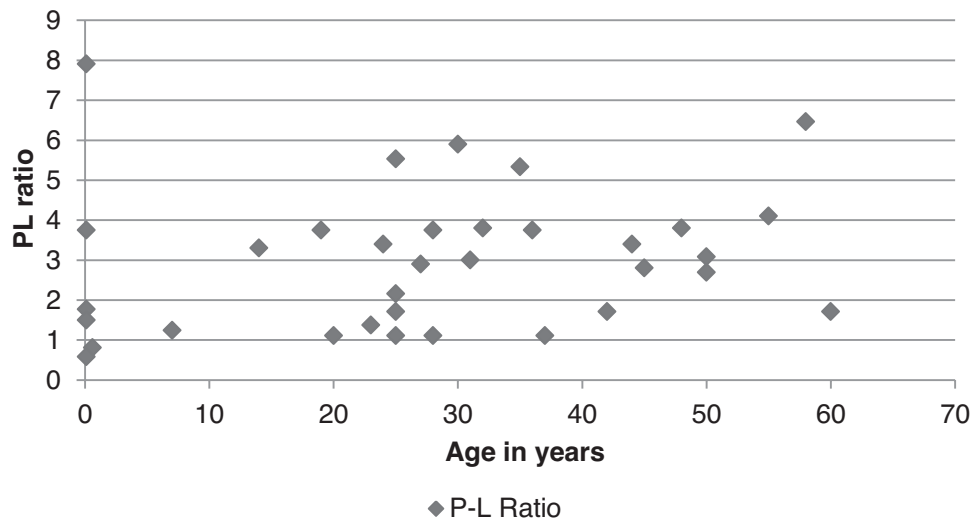
Figure 1: P–L ratio according to age.
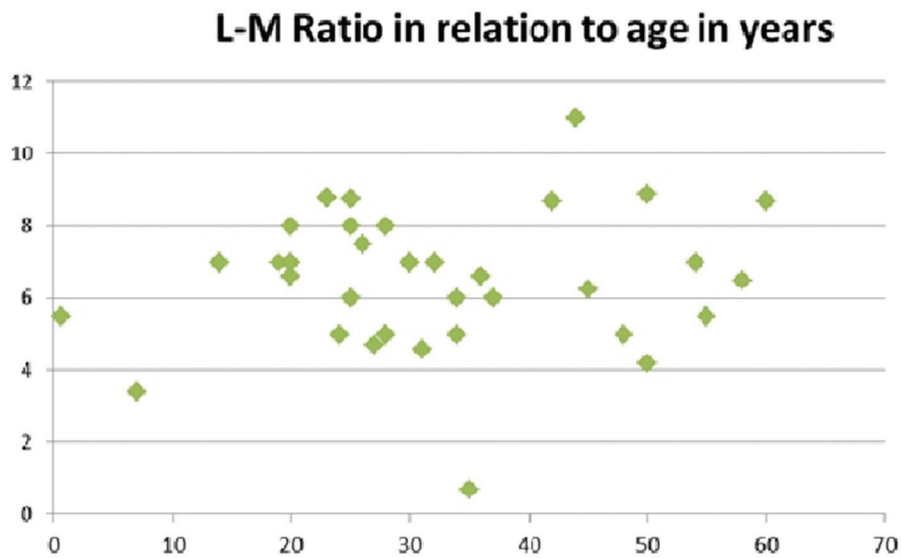
Figure 2: L–M ratio age wise.

secondary bacterial infection. Polymorphonuclear predominance does not rule out H1N1 infection.

Limitations of this study are we have included only Category-c patients of influenza A due to which number of patients included in this study is less. Therefore, diagnostic reliability of P–L ratio and L–M ratio in suspected influenza A patients needs to be evaluated in larger population. We also suggest starting pharmacotherapy in suspected patients as early as possible to reduce morbidity and mortality.

In conclusion, we have found out that P–L ratio and L–M ratio cannot be used as criteria of exclusion of H1N1 infection because of higher prevalence of secondary bacterial infection. This needs to be further evaluated in larger patient population.

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