

Hematological Profile in Patients with H1N1 - A Retrospective Analysis of 158 Cases

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Abstract

Original Research Article

H1N1 [Swine flu], a novel strain of Influenza A virus, has contributed to significant morbidity and mortality. The first case in India was identified in May 2009. Several outbreaks have occurred since then, yet very few studies on complete blood analysis of H1N1 Influenza have been reported. We conducted a retrospective study in 158 adult patients for whom H1N1 Influenza A virus was detected by RT - PCR method. Complete blood count reports of all the RT PCR positive patients were collected from the hospital information system and the laboratory data were retrospectively assessed and analysed. RT - PCR is considered as the gold standard for the diagnosis of H1N1 Influenza. Although RT PCR is a sensitive test, results are often delayed leading to difficulties in disease management. Rapid diagnosis of H1N1 Influenza is important for early initiation of anti viral therapy. Hence we analyzed the haematological parameters of H1N1 patients to identify a potential marker for H1N1 infection in order to help the clinicians to plan the treatment protocol for patients presenting with Influenza like symptoms while awaiting the PCR / culture reports. We could demonstrate that, lymphopenia and eosinopenia in the presence of clinical parameters may be helpful in identifying the cases of H1N1 while more sensitive laboratory test results are awaited.

Keywords: H1N1, Influenza, Lymphopenia, Eosinopenia.

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INTRODUCTION

H1N1 Influenza A viruses are associated with recurrent epidemics and occasional global pandemics [1]. In India, the first confirmed case of H1N1 swine flu was identified in May 2009 but thereafter, a huge number of cases have been reported [2]. Since then H1N1 swine flu has contributed to significant morbidity and mortality [3].

Influenza A viruses belong to Orthomyxoviridae family. They are classified into 16 HA subtypes [H1 to H16] and 9 NA [N1 to N9] subtypes based on the antigenicity of their hemagglutinin [HA] and neuraminidase [NA] molecules [4]. H1N1 is a novel strain of Influenza A Virus which has evolved by genetic reassortment. [5] Influenza is a common virus which causes a spectrum of respiratory infection ranging in severity from mild flu to life threatening pneumonia, bronchitis, acute respiratory distress syndrome and even death [2,3]. Hence, prevention, early laboratory diagnosis and treatment of the disease especially the severely ill cases are of utmost importance. Reverse transcriptase polymerase

chain reaction and throat swab culture are the preferred diagnostic tests for H1N1 Influenza. However, both these tests are time consuming which can result in significant delay in confirmation of suspected cases and their subsequent isolation [5]. The present study aims at analysing the haematological profile in patients with swine flu and identifying a reliable laboratory parameter which can serve as a marker for H1N1 infection in patients presenting with Influenza like symptoms while waiting for throat swab culture and RT PCR Reports.

MATERIALS AND METHODS

This retrospective study was conducted in our tertiary hospital. Laboratory data of 171 confirmed cases of swine flu in the year 2018 were retrieved from the records. Complete blood counts were obtained on the day of their admission from all the adult patients [aged more than 18 years] in whom Influenza A H1N1 was detected by RT PCR method. Complete blood counts were performed by automated analyzer – Beckman coulter LH 750. Laboratory parameters were recorded and retrospectively assessed. Pediatric cases and patients with haematological malignancies were excluded from the study.

RESULTS AND DISCUSSION

Table -1: Age and sex distribution of Influenza a H1N1 patients

Age in years	Male	Female	Total	Percentage
18 - 30	9	10	19	12.02 %
31 - 40	12	6	18	11.39 %
41 - 50	16	9	25	15.82 %
51 - 60	18	27	45	28.48 %
61 - 70	14	14	28	17.72 %
71 - 80	10	8	18	11.39 %
81 - 90	3	2	5	3.16 %
Total	82	76	158	100%

Table-2: Summarizes the Haematological findings of study subjects

Variable	Mean [n = 158]
RBC count [millions / cu.mm]	4.37 ± 0.76
Hemoglobin [gm / dl]	12.23 ± 2.22
Leucocyte count [cells / cu.mm]	10,120 ± 6984
Platelet count [1000 / cu.mm]	2.25 ± 0.76
Neutrophil lymphocyte ratio	9.16 ± 9.99

Table-3: Summarizes the blood cell analysis in H1N1 patients

RBC COUNT	Decreased	78	49.36%
	Normal	77	48.73%
	Increased	3	1.89%
WBC COUNT	Decreased	17	10.7%
	Normal	96	60.7%
	Increased	45	28.4%
PLATELET COUNT	Decreased	24	15.18%
	Normal	132	83.5%
	Increased	2	1.26%

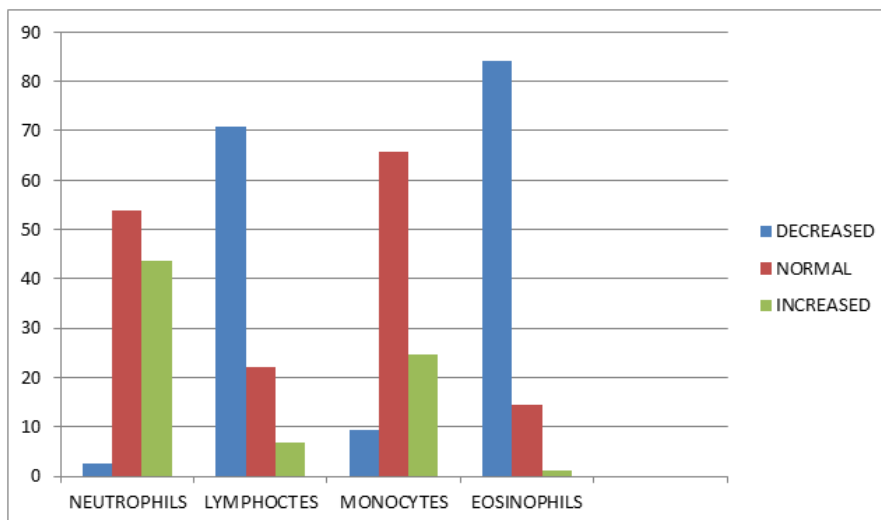


Fig-1: Comparison of Differential Leucoocyte Count in patients with H1N1

This study reveals the hematological profile of patients with H1N1 Influenza. Our study showed that while the higher incidence of swine flu occurred between the ages of 51 - 60 years [28.48 %], the mean age of the patients was 52.3 years with a male to female ratio of 1.08: 1.0. In the study conducted by George Merakoulis *et al.* [6], H1N1 was found to be more

common in younger individuals. The difference in age group may be attributed to exclusion of pediatric cases in our study or a change in the demographic trend with increasing number of cases over the years. A large scale, community based, prospective study [7] showed that H1N1 preferentially affected young children during the pandemic phase with a shift to adults in the post

pandemic phase. The study also suggested that the increased incidence of infection in children led to acquired immunity thereby decreasing the susceptibility to infection during the post pandemic phase.

Our results showed that most of the patients had a normal or slightly decreased haemoglobin levels. The total WBC count varied from 1800 to 48800cells/cu.mm. Studies carried out by Wang *et al.* [3] demonstrated leukopenia in 90% of cases whereas that of George Merekoulias *et al.* [6] showed a normal WBC count in 90% of cases. Contrary to their findings, we noted that leukopenia was observed only in 10.7% whereas normal WBC count was observed in 60.7% and leukocytosis in 28.45% of patients.

In majority of the cases, the differential count showed neutrophilic predominance with a decrease in the number of lymphocytes. Studies by Dhanoa *et al.* [8] have shown that bacterial co infection was common in patients with H1N1 Influenza especially in the older age group. According to their study patients with bacterial co-infection demonstrated higher rates of neutrophilia and leukocytosis. Our study demonstrated neutrophilia in 43.6% and leukocytosis in 28.45% of cases.

Lymphopenia was a consistent finding in previous studies [6, 9, 10] and it was observed in our study as well. Relative lymphopenia (less than or equal to 20% of WBC) was present in 112 of 158 patients. As shown in studies by Wang *et al.* [3], the ratio of lymphocytes are often increased in common respiratory illnesses such as those caused by Rhinovirus and Respiratory syncytial virus? Hence, Lymphopenia can be considered as a screening parameter for H1N1, in patients presenting with respiratory illness.

The Neutrophil Lymphocyte Ratio [NLR] was calculated as neutrophils / lymphocytes. The mean NLR in our study was 9.16 ± 9.99 which was comparable to studies by Quinzen *et al.* [11] which showed a mean NLR of 8.87 ± 9.85 and a much higher level 18.93 ± 38.44 was seen in bacterial infections.

Our study demonstrated eosinopenia (less than 1% of WBC count) in 133/158 patients. 123/158 patients had an eosinophil count of less than or equal to 0.5%. In fact, the eosinophil count was zero in 63/158 patients. Flick *et al.* [12] proposed that combined evaluation of clinical and laboratory parameters were clearly superior when compared to clinical criteria alone. According to the study, simple laboratory parameters like leukopenia, eosinopenia and decreased C reactive protein levels were significant predictors of H1N1 Influenza.

In our experience, we could demonstrate lymphopenia in 70.8% and eosinopenia in 84.1% of cases. Comparable to our study, the results obtained

from a study by Shen *et al.* [13] demonstrated lymphopenia in 96.4% and eosinopenia in 50% of their cases.

Thrombocytopenia was seen in 24 of 158 adults. Thrombocytopenia often accompanies influenza A virus infection and varied mechanisms like decreased production, splenic sequestration and direct or indirect platelet activation which promotes platelet - leukocyte aggregation have been implicated as possible causal factors for thrombocytopenia [14]. Studies have also shown that thrombocytopenia is a significant risk factor for mortality in patients with influenza a virus infection [15].

CONCLUSION

Early diagnosis of H1N1 Influenza is mandatory to begin preventive measures and commence antiviral treatment. Hematological profile is a simple, effective and a routine investigation done in all admitted patients. In our experience, lymphopenia was a constant finding in H1N1 Influenza, when compared to leukopenia or thrombocytopenia. Lymphopenia and eosinopenia along with other clinical parameters may be valuable aids in the diagnosis of H1N1 Influenza. Hence routine screening for haematological profile in patients presenting with influenza like illness is advocated to initiate early management strategies and decrease the morbidity related to it.

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