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AN EPIDEMIOLOGICAL SURVEILLANCE OF ILI AND SARI IN A TERTIARY CARE HOSPITAL, JORHAT

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ABSTRACT **Background:** Severe acute respiratory infection (SARI) and Influenza like illness (ILI) causes substantial mortality and morbidity world-wide. This study aims to characterize the epidemiology and clinical characteristics of SARI and ILI cases among the patients attending JMCH. **Methods:** SARI and ILI surveillance was conducted from 2019 to 2022. Retrospective analysis of case-based surveillance data pertaining to all reported SARI and ILI cases was performed. **Results:** Out of 365 ILI and SARI cases, 72 cases were identified for ILI and 293 cases for SARI. 13 samples (3.56%) tested positive for influenza by RT-PCR, of which 10 samples were positive for influenza A H1N1 and three samples for influenza A H3N2. The highest rate of Influenza A H1N1 was found in the age group of 16 to 25 years (40%; n=4). Similarly, influenza A H3N2 was shown to be positively equivalent in individuals aged 5 to 15, 6 to 15, and 56 to 65 (33.33%; n=1). Among the tested samples, the majority were male (58.72%, n=218,) as compared to female (40.27%, n=147). Symptoms of fever (98.63%; n=289) and sore throat (97.22%; n=70) was more prevalent among the SARI and ILI cases respectively. **Conclusion:** Continued and extended monitoring of SARI and ILI cases is in need to fully assess the burden of flu disease, define risk groups and establish better control measures.

KEYWORDS : Surveillance, Influenza, SARI, ILI

INTRODUCTION

Surveillance of influenza is essential for determining the commencement or spread of illness, monitoring the changes in seasonal influenza vaccine's composition, and acting as an alert mechanism for potential pandemic viruses. A pandemic that afflict a significant section of the population always had the potential to begin whenever a new influenza strain developed in the human population and spread from one person to another. The influenza virus is a contagious acute respiratory infection that causes 3-5 million serious cases and 290,000–650,000 fatalities each year [10]. Influenza viruses produce seasonal illnesses and are linked to morbidity and death around the globe, particularly in populations that are more vulnerable to flu [11]. Hospitalized patients who are exposed to other potentially contagious patients are at risk of developing ILI in compared to other individuals in the community. There was a lack of pertinent data on risk factors associated with a serious outcome in hospitalized influenza patients [16, 13]. The majority of research on risk factors for influenza is currently accessible from industrialized and/or high-income countries as compared to low- and middle-income countries where the antiviral therapy and vaccination uptake are inadequate [7, 15]. The Ministry of Health and Family Welfare, Government of India, started making preparations regarding the management of infected patients in order to enhance influenza surveillance in India.

The transmission of influenza and its occurrence depend upon the weather variability and seasonality and suggested to be strongly associated with climatic change. In tropical and subtropical countries like North-East India, the occurrence of seasonal influenza is poorly understood and more diverse. The literature that is currently available indicates that hospital surveillance of SARI is absent or insufficient to understand the prevalence of influenza virus and its circulating subtypes in North-East India. Therefore, this study aims to investigate the prevalence of ILI and SARI cases and to assess the epidemiology of Influenza in JMCH. The study will also aid in identifying the seasonal pattern of influenza, and the data collected will assist us to determine the efficacy of current vaccine in use in this region.

MATERIALS AND METHODS

Study Design: This study was a hospital-based surveillance study of admitted and outdoor patients. A total of 365 patients samples with ILI and SARI symptoms were collected from a tertiary care hospital of Jorhat during September 2019 to December 2022.

Study Setting: The samples were collected from in-patient and out-patient department of Medicine, and Pediatrics. Laboratory analysis of each sample were conducted in Viral Research and Diagnostic laboratory (VRDL), Department of Microbiology, JMCH.

Case Definition For Sample Collection: For the surveillance, suspected samples were defined as ILIs with a rectal or axillary temperature of >37.5˚C and at least one of clinical symptoms like sore throat, cough, rhinorrhea, or nasal congestion [20]. Simultaneously, SARI cases were defined as acute respiratory disease with history of fever or measure fever of ≥38˚C and cough with onset within last 10 days that require immediate hospitalization [23]. COVID-19 positive samples were excluded from the study.

Based on standardized data collection format specifically recommended by ICMR, clinical data of patients and risk factors associated with SARI, were collected from the hospital electronic records.

Laboratory Analysis: For laboratory diagnosis, nasopharyngeal/ throat swabs were collected in VTM and stored at -20˚C for further analysis. Real Time-PCR was performed for laboratory confirmation of influenza using NIV reagents for diagnosis of influenza A, influenza A (H1N1pdm09), influenza A (H3N2), influenza B/Yamagata and influenza B/Victoria. The ILI and SARI cases were compared based on clinical characteristics as well as outcome of positive and negative influenza cases. Patients positive for influenza were classified as influenza confirmed SARI cases. All the positive influenza cases were sent to RMRC, Dibrugarh for further confirmation.

Statistical Analysis

Qualitative data like age, gender, morbidities, and outcomes were analyzed. Chi Square test and Fisher's exact test were applied to test association between clinical outcomes and categorical variables. The statistical test was considered significant at $P< 0.05$. Ninety-five percent confidence intervals (95% CIs) were computed around point estimates.

Ethical Consideration

Since the influenza surveillance is a national-wide, governmental public health activity, therefore, institutional ethics committee approval was not required. In this study, the personal identifiers (e.g., names, address, occupations and so on) were not disclosed in order to maintain patient confidentiality, all the patient information was analyzed anonymously.

RESULT AND DISCUSSION

The strengthened surveillance of ILI and SARI cases led to collect a total of 365 patients' samples from 2019 to 2022. The positive rate was observed in 2019 and 2022 except for 2020 and 2021 due to emerging COVID outbreak. The surveillance data from the United States and Australia reported low-influenza activity during 2020/2021. These changes could be attributed to artifactual fluctuation as a result of decreased in routine health seeking for respiratory diseases and detection of influenza virus transmission as a result of significant SARS-CoV-2 mitigation measures [14].

During the study period, 72 ILI and 293 SARI cases were reported and out of these samples, 10 influenza A (H1N1) and 3 influenza A (H3N2) were found RT-PCR positive in 2019 and 2022 (Figure 1). There was no evidence of co-circulation of influenza types or subtypes in the current investigation.

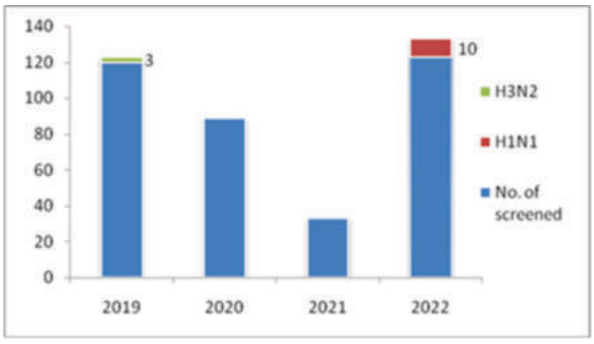

Figure 1: Annual Distribution Of Influenza-associated ILI And Sari Cases By Influenza Viral Subtype In A Group Of Patients Attending Jmch (n = 365) From 2019–2022.

The highest rate of Influenza A (H1N1) was found in the age group of 16 to 25 years (40%; n=4) followed by <5 years of age (20%; n=2). Subsequently, the positive rate of influenza A (H3N2) was found equivalent (33.33%; n=1), in <5 years, 6 to 15 years and 56 to 65 years respectively (Table 1).

Table 1: General Characteristics Of Each Patient Attending Jmch For Influenza-associated ILI And Sari Cases At Jmch During 2019-2022

Age (years)	Total cases (n=365)	ILI cases (n=72)	SARI cases (n=293)	Laboratory confirmation of Influenza A subtype	
				H1N1 (n=10)	H3N2 (n=3)
≤ 5	219 (60%)	8 (11.11%)	211 (72.01%)	2 (20%)	1 (33.33%)
06-15	20 (5.47%)	2 (2.77%)	18 (6.14%)	0 (0%)	1 (33.33%)
16-25	32 (8.76%)	27 (37.5%)	5 (1.70%)	4 (40%)	0 (0%)
26-35	17 (4.65%)	11 (15.27%)	6 (2.04%)	1 (10%)	0 (0%)
36-45	19 (5.20%)	9 (12.5%)	10 (3.41%)	1 (10%)	0 (0%)
46-55	15 (4.10%)	5 (6.94%)	10 (3.41%)	1 (10%)	0 (0%)
56-65	23 (6.30%)	7 (9.72%)	16 (5.46%)	1 (10%)	1 (33.33%)
≥ 66	20 (5.47%)	3 (4.16%)	17 (5.80%)	0 (0%)	0 (0%)
Mean	45.65	9	36.62	1.25	0.375
Gender					
Male	218 (58.72%)	36 (50%)	182 (62.11%)	5 (50%)	3 (100%)
Female	147 (40.27%)	37 (51.38%)	110 (37.54%)	5 (50%)	0 (0%)
Residence					
Urban	110 (30.13%)	25 (34.72%)	85 (29.01%)	2 (20%)	0 (0%)
Rural	255 (69.86%)	48 (66.66%)	207 (70.64%)	8 (80%)	3 (100%)

In this study it was found that influenza A was not detected in the age group of ≥66 years. The positivity rate of influenza A was significantly higher in ILI cases as compared to SARI cases among the different age group which correlates with previous findings [6, 1]. Additionally, this finding contributes to the upcoming researchers documenting that young children are at increased risk for developing severe respiratory infection which highlights the magnitude of prevention and control measures, such as vaccination, in these high-risk populations.

Among the total tested samples, the majority cases were found in male (58.72%, n=218), as compared to female (40.27%, n=147). For SARI cases, the highest affected patients were male as compared to female. Similar gender predominance was also reported by Salman et al., 2023 and Chakhunashvili et al., 2018 [19, 5] in which male was highly affected than female. However, increased risk of ILI was found slightly higher in case of female than male patients. The increased risk of ILI infection among females may be due to the fact that females have more frequent contact with children, who are more susceptible to ILI infection [12, 22].

This study showed that, in both SARI and ILI cases the rural population had the highest percentage of positive case compared to the urban population (Table 1). This study demonstrated that, when compared to the urban population, the rural population had the largest percentage of positivity in both SARI and ILI cases (Table 1). This may be due to inadequate medical facility and lack of awareness among rural residents towards diseases outbreaks [21, 8].

In SARI cases, the most prevalent underlying clinical symptoms were: fever (98.63%; n = 289), cough (98.29%; n=288), nasal discharge (74.66%; n=221), sore throat (69.99%; n=205) and breathlessness (61.09%; n=179) (Table 2). In a study conducted in Georgia for the surveillance sentinel of SARI also reported that fever (95%; n=1539), cough (86%; n=1392) and breathing difficulty (75%; n=1213) were the most common symptoms in SARI cases [5].

Table 2: Clinical Characteristics ILI And Sari Cases Of A Each Patients Attending Jmch During 2019–2022

Clinical Symptoms	ILI cases (n=72)	SARI cases (n=293)	Odds Ratio	CI (95%)	P value
Fever	68 (94.44%)	289 (98.63%)	0.24	0.06-0.96	0.029a*
Nasal discharge	60 (83.33%)	221 (74.66%)	1.63	0.83-3.2	0.153a
Sore throat	70 (97.22%)	205 (69.99%)	15.02	3.6-62.63	< 0. 001a*
Chest Pain	2 (2.77%)	98 (56.99%)	0.06	0.01-0.24	< 0. 001a*
Cough	70 (97.22%)	288 (98.29%)	0.61	0.12-3.2	0.552a
Breathlessness	0 (0%)	179 (61.09%)	0	0	< 0. 001b*
Headache	10 (13.88)	114 (38.90%)	0.25	0.12-0.51	<0.001a*
Body ache	4 (5.55%)	58 (19.79%)	0.24	0.08-0.68	0.003b*
Sputum	2 (2.77%)	75 (25.59%)	0.08	0.02-0.35	<0.001b*
Vomiting	0 (0%)	20 (6.82%)	0	0	0.018b*
Diarrhoea	0 (0%)	17 (5.80%)	0	0	0.029b*

[a]Chi-square test result; [b]Fisher Exact test result, *p value <0.05-Significant

These findings are also supported by the previous studies where fever with cough and sore throat with breathing difficulty were found to be the most common clinical symptoms in SARI cases [9, 3, 18]. The most common presentations among ILI cases were sore throat with cough (97.22%; n = 70), fever (94.44%; n=68) followed by nasal discharge (83.33%; n=60) (Table 2). Similar results also showed that among ILI patients, coughing and nasal discharge were the most prevalent symptoms [2, 4, 24]. Vomiting (6.82%; N=20) and Diarrhoea (5.80%; n=17) was also reported in SARI cases. A study done in China described vomiting and diarrhea was significantly more common among patients with SARI [17].

Despite the importance of these preliminary results, our surveillance system has limitations that should be addressed in future work. This study has several limitations, including the fact that it was conducted in a single institution with a small cohort of patients, necessitating caution when extrapolating the findings to larger populations. Furthermore, ILI is frequently employed in significant epidemiological research, although it has not yet demonstrated its value in patients who are hospitalized. Clinical presentations of SARI and ILI infection often vary in all age groups, and we only identified fewer episodes with which to assess various case definitions. Furthermore, the current findings offered a basic understanding of the viral agents linked to SARI and ILI. Since these infections can also be caused by various bacterial agents and therefore, further research is required to identify a wider range of viruses and other fastidious

organisms, to carry out thorough clinical examinations for better clinico-virological correlation, and to perform additional follow-up bacterial cultures to comprehend the role of secondary bacterial infection.

CONCLUSION

The surveillance of SARI and ILI at tertiary care hospital in Jorhat confirmed that influenza is an important cause of hospital admissions. Routine monitoring of infectious diseases along with their related etiological agents and data on surveillance along with laboratory analysis could provide preventive measures during disease outbreak. Analysis of the results from both cases demonstrated a lower level of relationship than the predicted values. This finding was likely a result of the study's inclusion and exclusion criteria. Therefore, further monitoring should be implemented with patient inclusion criteria to enable a larger enrolment that more accurately depicts the prevalence of SARI in the general community throughout flu season. Furthermore, this study offers hospital-based epidemiological data, but community-based larger research are necessary to arrive at a more precise and accurate knowledge of influenza by epidemiological principles of time, place, and person.

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Conflicts Of Interest: The authors have no conflict of interest to declare.

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