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EPIDEMIOLOGICAL STUDY OF INFLUENZA VIRUS INFECTIONS IN YANGON, MYANMAR

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Abstract: Although influenza is a highly contagious acute respiratory illness of global importance, little is known about the disease in tropical countries. An influenza survey was conducted in three sentinel sites in Yangon, Myanmar from September 2003 to December 2004. Throat or nasal swabs were collected from 616 patients with influenza-like symptoms and tested using rapid diagnostic test kits and virus isolation. Influenza B virus was detected in 6 patients from September to October, 2003. Influenza A viruses were detected in 133 patients from June to September, 2004, and the 51 influenza A viruses isolated from 72 specimens were all A/H3N2. Influenza virus infections occurred mainly in the rainy season in Yangon, Myanmar, but continuous ongoing influenza surveillance is needed.

Key words: influenza, acute respiratory infection, rapid diagnostic test kit, Yangon

INTRODUCTION

Influenza epidemiology varies according to the geographical location and climate. Influenza occurs mainly during winter in the temperate zones [1-3]. However, little is known about the epidemiology and seasonality of influenza in tropical zones, where influenza virus infections occur throughout the year with either no distinct seasonality or relatively intense activity during the rainy season [4-12].

Myanmar is divided into three areas; upper (northern), central, and lower (southern) Myanmar. The central and southern areas belong to the tropical zone while the northern area belongs to the temperate zone. The average temperature is 25℃ to 33℃ in the cold and rainy season (May-September or October), and 32℃ to 43℃ in the dry season (November-April). The rainfall ranges from 500 mm in the central dry zone to 5,000 mm in the coastal regions. Yangon, the capital city of Myanmar, has a tropical monsoon climate.

No epidemiological study of influenza virus infections has been conducted in Myanmar to date. We conducted the first study in Yangon from September 2003 to December 2004 and clarified the seasonality of influenza virus infections.

MATERIALS AND METHODS

Survey on Influenza Virus Infections in Yangon, Myanmar

The respiratory chest unit and pediatric department at Sanpya Hospital in Yangon were selected as sentinel sites for the study from September 2003 to December 2004. Two general practitioners working in the central Yangon also joined the study from June 2004.

The patients with influenza-like symptoms who participated in this study presented with a combination of symptoms such as fever of more than 38℃, coughing, rhinorrhea, myalgia, arthralgia, and diarrhea. A standardized questionnaire was used to obtain demographic data, medical history, and clinical features for each patient.

Virus Antigen Detection and Virus Isolation

Throat or nasal swabs were collected at the first clinic visit and subjected to influenza A and B virus antigen detection using influenza diagnostic kits (QUICK-S INFLU A/B "SEIKEN", Denka Seiken Co. Ltd, Tokyo, Japan). The positive specimens were placed in viral transport media, and then aliquoted in cryotubes and kept at −80℃ in freezers at Sanpya Hospital for further laboratory examinations.

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Specimens were transferred in frozen conditions and tested in the Department of Public Health, Niigata University Graduate School of Medical and Dental Sciences. Specimens were centrifuged at a low-speed and the supernatants inoculated into Madin Darby Canine Kidney (MDCK) cells to observe cytopathic effect (CPE) for influenza viruses. Type and subtype were determined by hemagglutinin inhibition (HI) tests with type- and subtype-specific antisera against 2004/05 influenza vaccine strains, such as A/New Caledonia/20/99 (H1N1), A/Wyoming/3/2003 (H3N2), and B/Shanghai/361/2002 (Denka Seiken Co. Ltd., Tokyo, Japan).

RESULTS

A total of 616 patients were tested with rapid diagnostic test kits during the study period, and none had a history of influenza vaccination. In 90% of patients, throat or nasal swabs were collected within the first 3 days after the onset of symptoms.

Among the 616 patients, influenza B viruses were detected in 6 patients (1%) in September and October 2003, all under 14 years of age. Influenza A viruses were detected in 133 patients (21.6%) from June to October with a peak in June 2004 **(Fig 1)**. The majority were under 14 years of age (88.7%), and only two patients were over 60 years of age **(Table 1)**. The sex ratio was 1.42 (men/female).

The clinical symptoms of influenza-positive patients did not differ from those of influenza-negative patients **(Table 2)**. The clinical diagnosis of patients with influenza-like symptoms was influenza, bronchiolitis, pneumonia, tuberculosis, respiratory syncytial virus infection, dengue fever, or enteritis.

A total of 72 specimens from the 616 patients tested with rapid tests were available for further virological examinations, and influenza viruses were isolated from 51 specimens (70.8%). All of these isolated strains were antigenically similar to A/Wyoming/3/2003 (H3N2), but not to A/New Caledonia/20/99 (H1N1) or B/Shanghai/361/2002.

Fig. 1. Number of influenza test positive patients per week, 2003-2004

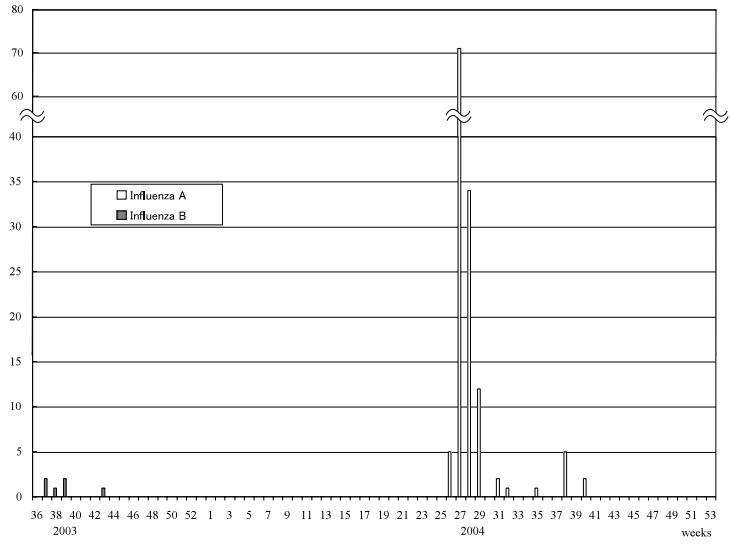

Table 1. Age distribution and percentage of influenza patients.

age	type A	type B	negative	total	% (positive)
0-4	79 (59.4)	2 (33.3)	324 (67.9)	405 (65.7)	20.0%
5-9	33 (24.8)	3 (50.0)	45 (9.4)	81 (13.1)	44.4%
10-14	6 (4.5)	1 (16.7)	18 (3.8)	25 (4.1)	28.0%
15-19	1 (0.8)	0	12 (2.5)	13 (2.1)	7.7%
20-59	12 (9.2)	0	64 (13.4)	76 (12.3)	15.8%
60-	2 (1.5)	0	10 (2.1)	12 (1.9)	16.7%
ND	0	0	4 (0.8)	4 (0.6)	0.0%
total	133 (100%)	6 (100%)	477 (100%)	616 (100%)	22.6%

ND: No data of age. Numbers in bracket are percentages.

Table 2. Clinical symptoms of influenza virus positive and negative cases

	Influenza viruses	
Clinical symptoms	Positive cases	Negative cases
fever (>38 ℃)	100%	100%
cough	95.5%	96.0%
rhinorrhea	97.0%	88.7%
myalgia	31.6%	28.0%
arthralgia	9.8%	16.1%
diarrhea	12.8%	16.9%

DISCUSSION

We conducted a sentinel surveillance of influenza virus infections in Yangon city from September 2003 to December 2004 and detected influenza B viruses at the end of the rainy season (Sept-Oct) in 2003 and influenza A viruses in the rainy season (June-Oct) in 2004.

Influenza virus infections are more common in winter in temperate countries but vary in tropical countries [6-12]. It has been noted that influenza viruses survive more readily in aerosols under conditions of low temperature and low humidity [13, 14]. These conditions coincide with the mechanism of seasonality of influenza in temperate countries, but the correlation is not clear in tropical countries. In tropical countries such as Thailand, Singapore and Indonesia, influenza viruses are detected throughout the year with one or two peaks depending on the study year, but there is not always a correlation between rainy seasons and peaks of influenza virus infections. In Singapore, no correlation has been found between influenza activity and climatic conditions or influx of travelers [10]. Mortality from influenza is probably greatly underestimated or not even reported in these regions because of the lack of good surveillance programs in many tropical countries. Our study in Yangon was a preliminary study of only one year in duration. Thus, further long-term studies in Yangon and other areas should be important additions to the epidemiology of influenza in tropical areas.

Between October 2003 and September 2004 in the neighboring country of Thailand, influenza B and A (H3) viruses co-circulated, the former predominating in 2003 and the latter in 2004 [4, 5]. Our study was insufficient in terms of subject number and study period, but the epidemiological data from these two countries was quite similar. In 2004, influenza A/H3N2 viruses predominated in Yangon as in many countries [4, 5]. Most of these isolated strains were antigenically similar to A/Wyoming/3/2003 (H3N2), a component of the 2004/2005 influenza vaccines recommended by WHO. They belonged to A/Fujian-like strain, which had circulated in Asia since 2002 and caused major epidemics worldwide in the 2003/2004 winter [4, 5]. Since virological surveillance is quite limited in tropical areas including Southeast Asian countries, the epidemiological study in Myanmar is important to global influenza surveillance. In our study, the rapid test-positive samples obtained in Myanmar were sent to Japan for virus isolation, and viruses were isolated from approximately 71% of the samples, suggesting that this manner of international collaborative study, though perhaps not ideal, is a viable option for participation in the WHO influenza surveillance network.

The clinical symptoms of influenza-positive patients did not differ significantly from those of influenza-negative patients in this study. The lack of differential diagnosis sometimes leads to misdiagnosis and the misuse of antibiotics. Therefore, the development and application of affordable test kits to detect pathogens other than influenza may also be helpful for the diagnosis of febrile diseases in tropical countries.

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