

Short Communication

Laboratory-Confirmed Dengue Fever and Chikungunya Fever Cases at the Narita Airport Quarantine Station in 2013

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SUMMARY: Fourteen patients were laboratory-confirmed cases of imported infectious diseases at the Narita Airport Quarantine Station in 2013. Blood tests were performed on 283 subjects suspected of having imported infectious diseases. Of these, 11 were diagnosed as having dengue fever (dengue) and 3 as having chikungunya fever (chikungunya) using real-time RT-PCR. The possible countries from which dengue virus infections were contracted were Thailand, Laos, Sri Lanka, and some other countries in Southeast Asia and South Asia. The 3 chikungunya cases were also diagnosed in individuals that returned from Southeast Asia. Most of the patients with dengue had a fever of over 38°C. The other symptoms were generalized fatigue, dull headache, pain behind the eyes, arthralgia, and digestive symptoms. Four of the patients were unaware of any mosquito bites. The information obtained from the confirmed cases showed that it is important to consider both the destination to which individuals travelled and the clinical symptoms, regardless of whether the subjects were aware of mosquito bites. The detection rate of chikungunya at the Quarantine Station was higher than that of dengue in all reported cases in Japan.

Medical examinations and blood tests for dengue fever (dengue), chikungunya fever (chikungunya), and/or malaria are performed at quarantine stations in Japan under Quarantine Law. Herein, we report the laboratory-confirmed infections diagnosed at the Narita Airport Quarantine Station (Narita Quarantine) in 2013.

A total of 5,254 symptomatic travelers visited the health consultation room at the Narita Quarantine in 2013. They were asked to fill in the travel questionnaire of the health consultation record which included information regarding the travel destination, duration of travel, awareness of mosquito bites, and subjective symptoms associated with the fever.

Then, blood tests were performed on 283 patients with their consent based on the suspicion of quarantinable imported infections: dengue, chikungunya, or malaria. The criteria for performing blood tests were as follows: symptomatic patients at a high risk of mosquito bites during their stay in an endemic area with a fever of over 37.5°C or patients at a high risk of mosquito bites in endemic areas with malaise, despite a lack of fever using antipyretics. To confirm the infections, real-time reverse transcription-polymerase chain reaction (real-time RT-PCR) (TaqMan RT-PCR; Qiagen, Venlo, Netherlands) to detect gene E of D1, D2, D4, and prM of D3 and DENGUE NS1 Ag STRIP® (Bio-Rad, Hercules, CA, USA) for dengue, real-time RT-

PCR to detect gene E for chikungunya, and a pLDH/HRP2 Combo Rapid Test® (ViroQuest Co., Osaka, Japan) were performed. In addition, microscopic examinations after staining smears with acridine orange and Giemsa and real-time PCR (Invitrogen™, Carlsbad, CA, USA) were used to detect the 18S rRNA gene of malaria.

Eleven cases of dengue (5 males and 6 females) and 3 cases of chikungunya (2 males and 1 female) were confirmed using real-time RT-PCR (Table 1). Of these, 10 cases of dengue were also positive using the NS1 rapid test. No cases of malaria were detected. The positive predictive value of the blood tests at the Narita Quarantine was 4.9%.

Although the test volume (128 cases from July to September) was more than in other seasons (52 from January to March, 46 from April to June, and 57 from October to December), the positive detection rate among the tested cases (5.5%; 7 cases out of 128) was higher in the summer season (July to September) compared with from January to March (1.9%; 1 case out of 52), April to June (2.2%; 1 case out of 46), and October to December (3.5%; 2 cases out of 57). These data are consistent with a report by Nakamura et al. (1).

The background information regarding the cases is shown in Table 1. The presumed countries from which the patients contracted the dengue virus infection were Thailand (3 cases), Laos (2 cases), Sri Lanka (2 cases), and other Southeast and South Asian countries. All the 3 chikungunya patients had returned from Southeast Asia.

The duration of the stay in these countries was between 10 days and a permanent resident among the cases of dengue (median, 24 days in the 10 cases excluding 1 resident), and between 6 and 15 days (median, 11 days) among the cases of chikungunya. Four patients with dengue and 1 patient with chikungunya were unaware of any mosquito bites. The period between onset and the

Received June 4, 2014. Accepted July 28, 2014. J-STAGE Advance Publication November 25, 2014.

DOI: 10.7883/yoken.JJID.2014.242

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Dengue Fever and Chikungunya Fever in 2013

Table 1. Background information of dengue and chikungunya fever cases confirmed by real-time RT-PCR

Case no.	Age	Sex	Serological type	NS1 test	Return month	Country the case might be infected in	Awareness of mosquito bites	Duration of travel (days)	Test day ¹⁾ (days)
Dengue fever									
1	30s	Male	D2	+ ³⁾	Feb	Indonesia	Yes	124	10
2	30s	Male	D3	+	Jun	Laos	Unknown	10	5
3	30s	Female	D3	+	Jul	Thailand	Yes	36	2
4	50s	Female	D1	+	Jul	Thailand	Yes	16	3
5	40s	Female	D2	+	Jul	Laos	Yes	32	4
6	<10	Female	D4	+	Aug	Philippines	No	94	1
7	10s	Female	D1, 4	+	Aug	Cambodia	Yes	11	4
8	20s	Female	D1	- ⁴⁾	Sep	Malaysia	No	Resident	3
9	20s	Male	D1	+	Sep	Thailand	Yes	15	3
10	40s	Male	D1	+	Nov	Sri Lanka	Yes	13	1
11	70s	Male	D1	+	Dec	Sri Lanka	Unknown	58	5
Chikungunya fever									
1	20s	Female	NA ²⁾	NA	Feb	Indonesia	Yes	6	3
2	10s	Male	NA	NA	Aug	Cambodia	Yes	11	3
3	40s	Male	NA	NA	Sep	Philippines	Unknown	15	3

¹⁾: Days after onset.

²⁾: NA, not applicable.

³⁾: +, positive.

⁴⁾: -, negative.

Table 2. Chief complaints and blood counts of the cases

Case no.	Body temp. (°C)	Symptom						Blood test			Test day ¹⁾ (days)
		General fatigue	Dull headache	Pain behind the eyes	Arthritic pain	Rash	Others	WBC (/μl)	Ht (%)	Plt (× 10 ⁴ /mm ³)	
Dengue fever											
1	38.8	Yes	Yes	Yes				2,200	48.2	5.1	10
2	38.6		Yes		Yes		Diarrhea	2,400	40.9	15.5	5
3	38.4	Yes	Yes					2,900	40.9	11	2
4	39.2				Yes		Vomiting	2,100	40.4	11.6	3
5	38.6		Yes					NA ²⁾	NA	NA	4
6	38.1	Yes	Yes			Yes		NA	NA	NA	1
7	39.6	Yes	Yes	Yes	Yes		Diarrhea, vomiting	NA	NA	NA	4
8	38.2				Yes		Vomiting	4,600	43.3	24.3	3
9	38.8	Yes	Yes	Yes				3,200	45.1	20.3	3
10	40.8	Yes					Thirst	10,700	45.9	22.9	1
11	38.0	Yes	Yes					1,800	44.9	5.7	5
Chikungunya fever											
1	37.5	Yes	Yes				Sore throat	3,400	39.5	18.4	3
2	38.3	Yes	Yes		Yes		Diarrhea, stomachache	NA	NA	NA	3
3	38.9	Yes			Yes	Yes	Cough	5,600	48.3	17.3	3

¹⁾: Days after onset.

²⁾: NA, not applicable.

WBC, white blood cell; Ht, hematocrit; Plt, platelet.

blood test in the cases of dengue was 1 to 10 days, and 3 days in the cases of chikungunya.

Most of the subjects with dengue or chikungunya were travelers returning from Southeast and South Asia. The distribution of dengue and chikungunya varies from region to region within a country. A detailed investigation according to geographical location has been implemented in only some countries (2). In addition, the incidence of dengue varies among countries (3). It is important to confirm the destination of travelers to diagnose infections. It is also desirable to provide detailed information in advance to travelers regarding the diseases that are epidemic at the destination.

The body temperature of all subjects with dengue and chikungunya at examination was over 38°C, except for 1. Patients reported other symptoms, including generalized fatigue, dull headache, orbital neuralgia, arthritic pain, vomiting, and diarrhea in the subjects with dengue, and generalized fatigue, dull headache, and arthritic pain in the subjects with chikungunya (Table 2). Four patients with dengue also had digestive symptoms, which was often the chief complaint. Travelers are also at a high risk of coinfection of the digestive tract. Four patients were unaware of any mosquito bites during their travel; thus, the diagnosis of dengue should be considered based on the traveler's destination and a

Careful review of all symptoms without relying excessively on the awareness of mosquito bites.

Complete blood cell counts were performed in some cases. The white blood cell counts of most subjects were between 2,000 and 3,200/mm³, and the platelet counts were less than 100,000/mm³ in 2 subjects with dengue (dengue case nos. 1 and 11) (Table 2).

Three subjects of chikungunya were detected at the Narita Quarantine, whereas only 13 cases were reported in Japan in 2013 (4). This represents a high detection rate of chikungunya (3/13) at the Narita Quarantine compared with that of dengue (11/249). One of the causative factors is that the incubation period of chikungunya is approximately 2–4 days (5), which is shorter than that of dengue. Viremia occurs sooner in chikungunya than in dengue following exposure to the viruses. Therefore, cases of chikungunya can be detected at the point of re-entry, whereas cases of dengue can be detected only after the subjects return to their homes. Currently, thermography is utilized to screen for fever at quarantine stations in Japan. The usefulness of thermography for influenza, which has a similar incubation period, has been reported (6). Therefore, chikungunya could be more easily detectable than dengue using thermography at the point of entry.

The number of patients with dengue and chikungunya is increasing worldwide. *Aedes aegypti*, which can transmit both dengue and chikungunya viruses, had been colonized historically (7) and the larvae were identified using surveillance inspections at the Narita International Airport in 2012 (8). Furthermore, *Aedes albopictus*, which can also transmit dengue and chikungunya

viruses, breed in Japan. The potential risk of endemicity in Japan might have increased.

It is important to continue to carefully collect data on cases of imported infectious diseases.

Conflict of interest None to declare.

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