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Timeline of COVID-19 in Tokyo and New Zealand: What will be Important and Can be Applied to Tokyo

Dashnyam Lkhagvasuren	School of Medicine, International University of Health and Welfare, Japan
Inomata Haruki	School of Medicine, International University of Health and Welfare, Japan
Iwashiro Eito	School of Medicine, International University of Health and Welfare, Japan
Iuchi Shoki	School of Medicine, International University of Health and Welfare, Japan
Uchida Marina	School of Medicine, International University of Health and Welfare, Japan
Iwata Kazuya	School of Medicine, International University of Health and Welfare, Japan
Imaya Kohei	School of Medicine, International University of Health and Welfare, Japan
Le Hoa Duyen	Dept. of Obstetrics and Gynecology, Graduate School, International University of Health and Welfare
Thaingi Hlaing	School of Medicine, International University of Health and Welfare, Japan
LE Tran Ngoan	Dept. of Occupational Health, Hanoi Medical University, Hanoi, Viet Nam

Background: Although Japan is a country with a very low number of COVID-19 related death, the number of cases has been increasing steadily. Currently Japan's metropolis Tokyo has the most number of confirmed COVID-19 cases of 7,927, roughly 36% of the total number nationwide by 13 July 2020. In this article, we analyzed the COVID-19 cases in Tokyo, concerning its time trend and compare it with those of New Zealand.
Aims: By comparing the time trend of COVID-19 cases in Tokyo with that of New Zealand, we aim to point out what will be important and can be applied to Tokyo.
Methods and Material: We used the database of daily registration and publication of confirmed cases of COVID-19 by the New Zealand Ministry of Health (1,544 patients), and metropolis Tokyo Government (7,927 patients) by 13 July 2020. Characteristics of confirmed cases include case ID, age, sex, import, and local transmission cases. The daily number of positive cases during these 171 days in both Tokyo and New Zealand was presented in Figure to compare the occurrence COVID-19 between two populations.
Results: The main characteristics of Tokyo COVID-19 cases is that it has two waves, and the fact that most of them are locally acquired cases. Even though in May, Tokyo has experienced a dip, starting from July cases have started to increase again with the record of 243 daily new cases on July 10th, 2020. In contrast, during the last 51 days, from 23 May to 12 Jul. 2020, there were no locally positive cases in the country in New Zealand.
Conclusions: Early detection of a possible incidence and suspected case, testing, tracing, self-care of each individual as well as strict isolation is recommended to control the COVID-19 infection for the next wave of infections.

Introduction

Ever since its identification in December 2019 in Wuhan, Hubei, China, the SARS-CoV-2 virus has resulted in an ongoing pandemic [1-2-3-4-5-6]. As of 13 July 2020, more than 12.5 million cases have been reported across 188 countries and territories, resulting in more than 560,000 deaths [2]. For the past half-year, the COVID-19 pandemic, caused by the SARS-CoV-2 virus, has shown a relentless ability to infect the world's population. The virus is highly infectious in a way it spreads in a cluster fashion that makes it distinctive from the influenza virus [5-7].

To prevent the spread of the virus, many countries across the world implemented lockdowns or declared a state of emergency which showed a noticeable impact on many sectors. Business and health care sectors in particular are known to have been affected the greatest. In the world where there is no treatment and vaccination for the virus yet, the prevention and the elimination strategy are mandatory and crucial to reduce the risk of COVID-19 infection.

While the Japanese government confirmed its first outbreak of COVID-19 in the country on 16 January 2020 in a resident of Kanagawa Prefecture it was not until 24 January 2020 that Japan metropolis Tokyo reported its first case [8]. Between January 16, 2020,

to July 13, 2020, Japan has reported 21,839 confirmed cases with 18,003 recoveries, and 983 death counts [2]. Among this, metropolis Tokyo holds the highest number of confirmed cases. Since the first case in Tokyo was reported on January 24, the number of cases has been increasing continuously. These numbers are relatively smaller than in other developed countries and big cities [8]. Still, COVID-19 cases are steadily increasing, which suggests that Tokyo is still having a struggle to take over control. Given how infectious and dangerous this virus is, multiple measurements and strategies are still required. A poorly controlled pandemic has already increased health inequities, causing health care system problems and the same issues will be expected in other pandemic waves [8]. To avoid the same situation, there are some strategies Tokyo can learn from other countries that could make it work for COVID-19.

In this article, we will summarize the time trend of COVID-19 in Tokyo, focusing on the difference between Tokyo and New Zealand, a country that has a better outcome with controlling COVID-19 infection as of today, and describe what will be important and can be applied to Tokyo.

Materials and Methods

The method of descriptive epidemiology was applied to describe the current ongoing pandemic of COVID-19 in Tokyo and New Zealand. We analyzed the number of people who were infected with COVID-19 in Tokyo (7,927 patients) [8] compared with that of New Zealand (1,544 patients) [9]. We make figures for a timeline of positive cases per 100,000 people and positive cases per 100,000 people by age for both Tokyo and New Zealand. Data was daily accessed from the Tokyo Metropolitan Government and the New Zealand Ministry of Health's Website for every COVID-19 positive case from January 24 to July 13, 2020.

Characteristics of daily reported positive cases included ID, age, sex, local, and import transmission cases. We have been updated the database every day since about the first positive case tested positive with COVID-19 in Tokyo from January 24, 2020, to July 13, 2020, for Tokyo and New Zealand.

The first positive case of COVID-19 in Tokyo was on January 24, 2020, from a male patient between the ages of 40 to 49 who returned from Wuhan city, Hubei, China [8]. As of today on the date of July 13, 2020, the total number of COVID-19 positive cases in Tokyo is 7,927. The latest confirmed case by July 13, 2020, is from a male who is in the age group of 20-29, local transmission case [8].

In New Zealand [9], the first positive case was on February 26, 2020, from a female, aged between

60-69 who returned from Indonesia. Currently, as of the date of July 13, the number of confirmed COVID-19 patients in New Zealand is 1,544. The latest confirmed import case was on July 11, 2020, from a female who is also in the age group of 20-29 [9].

Data analysis

The obtained database in Excel files in both Tokyo and New Zealand during 171 days, from 24 Jan. to 12 Jul. 2020 was summarized by sex and age group using the STATA-10. The daily number of positive cases during these 171 days in both Tokyo and New Zealand was presented in Figure to compare the occurrence COVID-19 between two populations.

Results

Figure 1 shows the number of patients who tested positive with COVID-19 in Tokyo and New Zealand between January 24, 2020, to July 10, 2020. The total number of COVID-19 positive cases between this timeline is 7,927 in Tokyo. Tokyo had two waves of COVID-19 occurrence, the first wave reached a peak on April 18, 2020, with 206 positive cases, and the second wave reached a peak on July 9, 2020, with the highest number of cases ever seen in Tokyo with 243 positive cases. In May, due to the state of emergency being declared the number of the daily positive cases has been steadily dropped until it remained below 50. However, since the state of emergency ended, the daily number steadily rose again. More than 100 new cases have been reported between July 2 to July 7. Due to the government, easing the restriction of the usage of public areas the number of cases continues to grow and is showing signs of an upward trend of daily new cases.

Figure 1: The Timeline of Daily Positive Cases in Tokyo and New Zealand.

Most of the Tokyo COVID-19 cases are believed to be local transmissions. Meanwhile, New Zealand had only one wave and the peak was on March 27, 2020, with 84 positive cases, by the end of follow-up time on July 12, 2020. In New Zealand’s case, most COVID-19 transmissions are import cases. Figure 2 shows the number of import and locally transmitted COVID-19 test-positive cases in New Zealand between January 24, 2020, to July 12, 2020. The first import case in New Zealand was on 26 Feb. 2020 and the last case was on 11 Jul. 2020. The first local case was on March 4, 2020, and the last case was on May 22, 2020. During the last 51 days, from 23 May to 12 Jul. 2020, there were no locally positive cases in the country. In New Zealand, 69% of the total cases were import-cases, and 31% of the total cases were locally acquired cases.

Figure 2: The Timeline of Daily Positive Cases in New Zealand Categorized as Import Cases and Local Cases.

Table 1 presents 9,471 patients’ characteristics in terms of nationality, age group, and sex. Most of the patients are between 20-29 years old both in Tokyo and New Zealand which are 27.49% and 24.16% of the study participants, respectively. Compared to New Zealand’s of 7.64%, Tokyo has twice the percentage of COVID-19 cases in the elderly (over 70 years old). Rather than cluster infection in the elderly, this can be explained by the aging society of Japan. New Zealand, however, has a significantly higher percentage of cases in age groups of 10-19. This is caused by cluster infection in the educational department.

	Tokyo		New Zealand		Total
Sex	Case	%	Case	%	
Male	4,714	59.47	690	44.69	5,404
Female	3,206	40.44	854	55.31	4,060

Unknown	7	-	0	-	7
Total	7,927	100	1,544	100	9,471
Age group					
0-9	132	1.67	37	2.4	169
19-Oct	157	1.98	122	7.9	279
20-29	2,179	27.49	373	24.16	2,552
30-39	1,580	19.93	245	15.87	1,825
40-49	1,099	13.86	221	14.31	1,320
50-59	975	12.3	248	16.06	1,223
60-69	638	8.05	180	11.66	818
70+	1,159	14.62	118	7.64	1,277
Unknown	8	-	0	-	8
Total	7,927	100	1,544	100	9,471

Table 1: Distribution of Positive Cases by Age Group and Sex in Tokyo and New Zealand.

In New Zealand, most of the patients are between 20 and 29 years old, which is over 15% in Tokyo and almost 8% in New Zealand. The percentage of infection under 19 years old is low and it tends to gradually decrease with age after thirties in both countries. The number of patients between 10 to 19 years old in New Zealand is higher than those in Tokyo. (Data not shown).

Discussion

The main findings of our current work are timely explored features of the SARS-CoV-2 virus spread and comparing outcomes of prevention activities of New Zealand and Tokyo against this ongoing pandemic.

New Zealand has almost been successful in suppressing the local cases while Tokyo’s number of infections is rising day to day due to locally transmitted cases [8-9]. The biggest factor that affected this outcome could be whether a nationwide lockdown has been implemented or not. On 21 March, a four-level alert system was introduced in New Zealand [9]. According to this alert system, New Zealand carried out a strict nationwide lockdown (level 4) on 25 March, almost a month after the first case which was reported on 28 February 2020. The nationwide lockdown was lifted on 27 April [9]. This nationwide lockdown caused the closure of all services except essential services like supermarkets, petrol stations, and health care services. Since the national lockdown had been set through a new law named “Covid-19 Public Health Response Act 2020” violations resulted in penalties or police detention. On the other hand, in Tokyo [8], the Japanese government declared a state of emergency, which is much looser than lockdowns as there are no levels and no penalties involved. This state of emergency was declared on 7 April, almost 2 months after the first confirmed case on 24 January [8]. The state of emergency ended on 25 May [8]. The main purpose of Japan’s state of emergency is said to be to reduce the number of new infections and to prevent the collapse of the medical service system [8]. Although the peak in the number of new infections based on the reporting date occurred on 10 April and the peak load on medical service was on 27 April it is believed that the effective reproduction number started to decrease by 7 April [8]. The increase in confirmed cases during the isolation period is because the trend in the number of new infections shows the infection situation approximately 2 weeks prior. After the state of emergency lifted, the numbers began to have an upward trend again.

The difference between the response rate as well as the difference between the strictness of the infection control process could be the reason why New Zealand managed to catch their local transmission cases while Tokyo’s case numbers are still increasing [8-9]. Even though New Zealand’s population is 4,900,000 (less than half the population of Tokyo, Japan) and the number of viruses which invade to New Zealand in the early stages was small, New Zealand shows good

strategy on how to prevent the spread of infection and how to reduce new, locally transmitted infections continuously.

There are few things to be considered in this comparison of Tokyo with New Zealand. One of them is the size of the data we are using as a comparison. This is one of our research's limitations as we are comparing a limited region to a whole country. Another thing to consider is whether the number confirmed positive cases is accurate or not. Currently, the PCR test is being used worldwide to confirm a COVID-19 infection. However, the standard of conducting a PCR test is not unified throughout every country. Japan's criteria for the PCR test include a fever of 37.5 degrees that lasted 4 days or more, lethargy, and difficulty of breathing worse than those of influenza [8]. For those who have the aforementioned symptoms, they are required to consult with consultation centers in which they will be determined if they should be tested. This strict criterion has been criticized as it does not apply to people with milder symptoms [8]. Compared to these strict criteria, New Zealand conducted a test on people who were deemed suspicious [9]. This mostly included people who came from foreign countries.

Variance in PCR testing could be due to the different purposes of it being conducted. Although criticized, Japan's goal of PCR test is not to identify all infected people, but rather to focus resources on those most in need of treatment and to trace clusters of infection [8].

On top of the cluster-based approach, behavioral modification of citizens has been one of the counter- measures against this pandemic [8]. Japanese people, according to their national characteristics, follow the government orders diligently. Even so, a sense of crisis for each individual being different, there are clusters of people who are not molding well into the situation. This is one of the biggest sources of asymptomatic patients, who are greatly contributing to spreading the infection. Each individual must change their behavior and live in a synchronized to the environment so that the regained as soon as possible.

In conclusions, an increase in the number of infected people in Tokyo can be seen after the declaration of the state of emergency has been lifted on May 25, 2020. It can be said that the Japanese citizen's disciplined nature alone is not very effective and a sudden increase in social activities is increasing cluster formation. Judging from the almost flattened curve during the period of emergency it can be concluded that strict isolation can help with containing local transmission cases.

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