Geographic correlation between the number of COVID-19 cases and the number of overseas travelers in Japan, January-February 2020

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Materials & Methods

Aim

To evaluate the geographic association between the number of overseas travelers, especially from mainland China, and the number of COVID-19 cases in 47 prefectures during the first month after the outbreak started in Japan.

Materials & Methods

Data:
1. COVID-19 case data in Japan
   Epidemiological information on 69 COVID-19 cases reported from the Ministry of Health, Labour and Welfare (MHLW) from January 16 and through February 21, 2020 was collected.

2. Overseas travelers data
   The total number of travelers and the number of Chinese travelers, extracted from the Japan National Tourism Organization (JNTO) from January to November 2019.

Results

3. Genome sequence data of COVID-19
   • Full length sequences of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) sequence registered in Global Initiative on Sharing All Influenza Data (GISAID) were used.
   • Japan (15): January 20, 2020 - March 12, 2020
   • China (15): December 1, 2019 - March 31, 2020
   • Italy, France, Brazil, Canada, US (1 at a time): March 31, 2020

3. Correlation analysis
   The correlation between the number of COVID-19 cases at prefectural level and the number of overseas travelers was calculated using Spearman’s rank test.

4. Phylogenetic tree analysis
   A phylogenetic analysis by maximum likelihood estimation was performed to examine the lineages of COVID-19.

Discussion

The number of COVID-19 cases and the total number of overseas travelers and the number of Chinese travelers had strong positive correlations.

The SARS-CoV-2 strains detected in Japan during January and February were classified as Chinese lineages.

The initial border screening in Japan was not sufficiently effective, suggesting that secondary transmissions in the community may have occurred.

Acknowledgement

This study was funded by the J-GRID from AMED [grant number: JP19fm03010090005]. COI: All authors have no COI relationship to disclose.