Changes in numbers of COVID-19 cases among residents of sightseeing resort areas before and during the “Go To Travel” campaign: Descriptive epidemiology in Gunma Prefecture

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Title:

Changes in numbers of COVID-19 cases among residents of sightseeing resort areas before and during the “Go To Travel” campaign: Descriptive epidemiology in Gunma Prefecture

Running title: Impact of the “Go To Travel” in the resort area

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Summary (171/200 words)

The “Go To Travel” campaign in Japan, which encouraged people to travel throughout the country, was started in July 2020 to revitalize economic activity that was sluggish due to COVID-19. Although risks of infection spread have been reported for tourists crossing prefectural borders, the spread of infection among residents living in sightseeing resort areas is unclear. This study evaluated the number of COVID-19 cases in residents of sightseeing resort areas in Gunma Prefecture using the descriptive epidemiological method. Data about infected individuals were obtained from open data on the prefectural official homepage. Evaluation of epidemic curves showed that the number of infected cases increased slightly after the start of the campaign, with numbers affected by the occurrence of clusters. Toward the end of 2020, the number of affected cases increased in both resort areas and non-resort areas, with the increase being smaller in resort areas. Thus, the increased occurrence of infection during the campaign suggested a need to take additional preventive measures more so for tourists than for resort area residents.
Introduction

Owing to the coronavirus disease-2019 (COVID-19) pandemic, many people in Japan have refrained from leaving their homes, curtailing not only general social activities but reducing the numbers of tourists visiting resort areas (1). Because of the enormous economic damage due to COVID-19, the government of Japan developed the “Go To Travel” campaign in April 2020 to revive travel activity (2). This campaign, which was launched in July 2020, was designed based on the expectation that the COVID-19 pandemic would end within a few months (3). Because the second wave of the pandemic in Japan started in the latter part of July, overlapping the summer vacation, the campaign was launched in the midst of the epidemic.

The business community in Japan, especially businesses in tourist areas, continued to support this campaign, which could not be halted immediately. The Government of Japan did not evaluate the details of the association between the campaign and the second wave of the pandemic wave, and the campaign was continued. Indeed, there was little evidence at that time about the effects of this campaign, making detailed evaluation difficult. It was likely, however, that movements of populations helped spread infection (4, 5). Tourists moving across prefecture borders were found to be at higher risks than native populations,
suggesting that the “Go To Travel” campaign may have spread COVID-19 (6). The risk of COVID-19 infection in residents of resort areas, who manage hotels and guest houses and therefore cannot travel elsewhere, may differ from the risk of infection in tourists. In designing future policies, the effects of campaigns should be evaluated not only in tourists but also in residents of resort areas. The present study therefore hypothesized that, if the “Go To Travel” campaign was associated with the spread of COVID-19, both tourists and the residents of resort areas would be at higher risk of infection, manifesting as an increase in the numbers of infected individuals. To evaluate this hypothesis, the relationship between the “Go To Travel” campaign and the number of case reports was assessed in residents of Gunma Prefecture, which contains several well-known resort areas, before and during the “Go To Travel” campaign.

**Materials and Methods**

**Study subjects**

This study utilized COVID-19 case information reported daily for Gunma Prefecture. These data were based on the results of polymerase chain reaction (PCR) and antigen tests performed by medical institutions and the Gunma Prefectural Institute of Public Health and Environmental Sciences, and reported on the Gunma Prefecture official
homepage (7). All data were recorded as not symptom onset date but PCR or antigen test positive date. Additionally, residential information of respective cases was also used for analysis.

Gunma Prefecture is located in the center of Honshu, the main island of Japan, and includes around 1,950,000 residents (8). This prefecture is divided into 10 regions based on medical care zones which is usually used for infectious disease statistics, containing 55,000 to 427,000 residents (9) (Figure 1, Table 1).

Because information on the public use of the “Go To Travel” campaign in Gunma Prefecture was unclear, the total number of campaign users throughout Japan, based on information from the Japan Tourism Agency, was used as a reference (10). The numbers of monthly total campaign users from July to December 2020 were 2,070,000, 13,260,000, 14,180,000, 22,060,000, 25,650,000 and 5,600,000, respectively. Because the campaign was started on July 22, the figure for July 2020 represents only 10 days. Moreover, user information was halted on December 15, 2020; therefore, the recorded number, 5,600,000, was doubled to 11,200,000. In addition, the number of tourists were reported to increase in Gunma Prefecture after starting the campaign according to a global positioning system location data survey (11), a relatively large number of tourists were regarded as using the campaign in this study.
Areas classified into resort area and non-resort area

Epidemic curves were drawn for each of the 10 districts in Gunma Prefecture (data not shown). After that, although to determine the effect of the campaign it was desirable to make comparisons using the effective reproduction number, the number of cases was insufficient to draw the epidemic curve and could not be used to calculate a valid reproduction number. Therefore, the number of cases was simply used for comparison in this study. The numbers of cases in each region was determined monthly for the duration of the “Go To Travel” campaign. Furthermore, these 10 regions were divided into two areas to determine the effect of the campaign on sightseeing resort areas. According to a survey report of sightseeing tourists by Gunma Prefecture (12), most tourists responded that they came for the purpose of “hot spring and health,” thus the hot spa region was used as the focus of analysis in this study. Furthermore, the survey also showed that more tourists visited Kusatsu Onsen, Minakami Onsen, and Ikaho Onsen than other places. Thus, these three northern regions of Gunma Prefecture, B, G and H (Figure 1) are the spa resorts including Ikaho Onsen, Kusatsu Onsen and Minakami Onsen which have hotels and guest houses (12, 13). The other seven regions of Gunma Prefecture, A, C, D, E, F, I and J, are mainly residential areas (Figure 1). Thus, regions B, G and H were
regarded as the “resort area group” and the other seven regions as the “non-resort area group”. The study hypothesized that, if many tourists visit using the campaign and spread COVID-19 virus, then the increase in infected subjects would be greater in the resort area group than in the non-resort area group.

Analysis

Based on the hypothesis, the numbers of reported cases were compared for the approximately 4 month period before the start of the “Go To Travel” campaign (March 7 through July 21) and the approximately 5 month period during the campaign (July 22 through December 28). Because tourism during the respective periods of before and during the campaign may have been affected by seasonal events, every month was not regarded as equal. Therefore, the cases of four months before and five months during the campaign were cumulated respectively and simply compared. Moreover, because the actual numbers of cases were influenced by the population sizes of respective regions, the incident rates (IR) per 100,000 residents were determined and the incident rate ratios (IRR) before and during the campaign and in resort and non-resort areas were compared.

Ethics
This study was based only on open data on the Gunma Prefecture official homepage; therefore, individual information was not included. The study procedure was approved by the Medical Ethical Committee of Gunma University (HS2020-096).

Results

The total number of COVID-19 cases in Gunma Prefecture, both before and during the “Go To Travel” campaign, was 2,175, with no steep increases in the number of cases just after the start of the campaign (Figure 2). Prefectural reports indicated that the increases were associated with several clusters. Integration of all data into one epidemic curve showed that the number of cases increased slightly after the start of the campaign, with several clusters occurring from August to October, and a marked increase from the end of November to the end of December (Figure 2). There was no correlation between the epidemic curve and the numbers of campaign users in Gunma Prefecture, indicating that the epidemic dynamics did not correspond to the “Go To Travel” campaign.

Before the start of the “Go To Travel” campaign, there were 149 cases in non-resort areas and 14 in resort areas. During the campaign, there were 1909 cases in non-resort areas and 103 in resort areas (Table 2-a). The respective epidemic curves showed time dependent changes (Figure 3-a and 3-b). The ratios of the cases during vs before the
campaign were 12.8 in non-resort areas and 7.4 in resort areas, indicating that the cases in the ratio over time was greater in non-resort than in resort areas.

Next, the cases were adjusted for population size shown with IRs. Before the start of the “Go To Travel” campaign, the IRs in non-resort and resort areas were 8.7 and 5.6, respectively, per 100,000 residents. During the campaign, the IRs in non-resort and resort areas were increased to 111.6 and 41.5, respectively, per 100,000 residents (Table 2-b). Thus IRRs during vs before the campaign were same as the above non-adjusted result. In addition, IRRs in resort vs non-resort areas were 0.65 before and 0.37 during the campaign, indicating that the IRR in resort vs non-resort areas decreased over time.

**Discussion**

This study focused on how the “Go To Travel” campaign, which was launched to promote the Japanese economy, affected the incidence of COVID-19 infection in residents of resort areas of Gunma Prefecture. Because open data about “Go To Travel” campaign tourist was lacking at the time of this study, the affect of the COVID-19 infection spread by the campaign was determined using limited data. Thus, at this time, a descriptive epidemiology according to prefectural open data was used to determine whether the incidence of COVID-19 increased in resort and non-resort areas. Although
the number of cases increased after starting the campaign, with some clusters observed in several regions of the prefecture, there was no marked increase in cases from July to November 2020. The number of cases increased around the end of November, but this increase did not correspond to the number of participants in the campaign. Additionally, the number of cases reported in resort areas was lower than that in non-resort areas of Gunma Prefecture. In other words, although it was difficult to show any detailed time-course change caused by the campaign, the fact that the campaign had less effect on resort area residents than non-resort area residents was shown in this study. To author’s knowledge, this is the first report to compare the incidence of COVID-19 in residents of resort and non-resort areas.

The total number of cases after the start of the campaign increased in all regions of Gunma Prefecture, especially at the end of the year. The author had hypothesized that the number of cases would show a greater increase in residents of resort than of non-resort areas. The author found, however, that the IRR was higher in residents of non-resort (12.8) than of resort (7.4) areas, and that the number of affected residents of resort areas did not increase significantly, thus contradicting the hypothesis. These results indicated a lack of relationship between COVID-19 and place of resort area residence. Rather, visitors to these areas may be at greater risk of COVID-19 than residents consistent with
results showing an increased incidence of COVID-19 in tourists, especially after crossing a prefectural border (6). In Japan, both tourists (14) and managers of hotels and guest houses (15) were required to implement infection control measures. Gunma Prefecture thoroughly implemented these measures for tourist destinations, with the results suggesting that these infection control measures may be functioning properly in resort areas. Furthermore, contact between residents of resort areas and between tourists and local residents may be minimal due to low population density and implementation of social distancing measures. However, this result does not provide any insight to further promote the activities of the “Go To Travel” campaign, as the number of affected individuals had increased in all regions during the campaign.

Epidemic curves showed that small numbers of cases occurred from the start of the campaign in July until October, followed by reports of clusters associated with restaurants and nursery facilities, increasing in the number of infected individuals. Clusters may have had a direct impact, increasing the total number of cases in Gunma Prefecture. Another increase in cases was observed in all regions from the end of November until the end of the campaign in mid-December. The finding, of more cases toward the end of the year than just after the start of the campaign, suggests that habitual seasonal activities, such as year-end dinners and homecoming, were responsible for this increase. Although the affect
of “Go To Travel” campaign may not have extended beyond the seasonal events, it was valid to interpret that the campaign was one of several risk factors for COVID-19 infection spread.

This study has several limitations. First, because the study included open data of cases diagnosed with COVID-19 based on the results of PCR and antigen tests, asymptomatic individuals could therefore not be evaluated. In addition, because the accurate number of tourists in Gunma Prefecture was unclear and limited open data was used, the effect of the campaign may remain only an estimation. Furthermore, because the increase of cases may be associated with the increase of test frequency, another study is also needed. To solve these limitations, contact tracing and/or genomic analysis in all cases are required to determine cause-effect relationships. Second, because the “Go To Travel” campaign overlapped with the summer vacation, the number of cases reported just after the start of the campaign were not due only to the campaign itself, but could have been due to summer vacation. Moreover, the “Go To Travel” campaign overlapped with the “Go To Eat” campaign, conducted from October 1 to November 24, making it difficult to determine their respective effects. Third, the present study did not include information on subject age or gender. Because this study analyzed the difference in reported cases in resort and non-resort areas and changes over time, individual information was deemed unnecessary.
These limitations will be addressed in future studies.

In conclusion, this study found that more cases of COVID-19 were reported after starting the “Go To Travel” campaign regardless of the residential or resort area locations in Gunma Prefecture. However, the campaign had relatively little effect on the number of reported cases of COVID-19 among residents of resort areas. The promotion of travel campaigns in Japan should include radical infection control measures for tourists more so than for resort area residents.

Acknowledgements

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Conflict of Interest

None to declare.
References


8. Gunma Prefecture. About Gunma Prefecture. Available at


Figure legends

Figure 1. Maps showing the location of Gunma Prefecture in Japan and the 10 regions of the prefecture

A general view map shows that Gunma Prefecture is located in the center of Honshu, the main island of Japan. An enlarged view map shows the subdivision of Gunma Prefecture into 10 regions based on medical care zones. The northern regions B (e.g. Ikaho), G (e.g. Kusatsu) and H (e.g. Minakami) are spa resort areas, whereas the other regions (A, C, D, E, F, I, and J) are residential, non-resort areas.

Figure 2. Epidemic curves for Gunma Prefecture

Beginning on March 7, 2020, case reports on COVID-19 were submitted to the government of Gunma Prefecture and reported on its web page. Some clusters were observed immediately after the launch of the “Go To Travel” campaign on July 22. Gray bars with right axis data indicate the numbers of monthly participants throughout Japan until the end of the campaign (December 28). Although a small number of cases was reported at the beginning of the campaign, most occurred at the end of 2020 and the beginning of 2021.
Figure 3-a Epidemic curves of the non-resort areas (A, C, D, E, F, I and J) and 3-b Epidemic curves of the resort areas (B, G, and H) in Gunma Prefecture.

The respective epidemic curves showed time dependent changes, with showing that the changes in numbers of cases were lower in resort areas than in non-resort areas.
Table 1 Ten regions of Gunma Prefecture

<table>
<thead>
<tr>
<th>Region</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Maebashi</td>
<td>334,715</td>
</tr>
<tr>
<td>B Shibukawa</td>
<td>112,450</td>
</tr>
<tr>
<td>C Isesaki</td>
<td>246,364</td>
</tr>
<tr>
<td>D Takasaki-Annaka</td>
<td>427,193</td>
</tr>
<tr>
<td>E Fujioka</td>
<td>67,651</td>
</tr>
<tr>
<td>F Tomioka</td>
<td>70,561</td>
</tr>
<tr>
<td>G Agatsuma</td>
<td>54,724</td>
</tr>
<tr>
<td>H Numata</td>
<td>81,030</td>
</tr>
<tr>
<td>I Kiryu</td>
<td>161,958</td>
</tr>
<tr>
<td>J Ota-Tatebayashi</td>
<td>401,969</td>
</tr>
</tbody>
</table>
Table 2 COVID-19 cases before and during “Go To Travel” campaign in non-resort and resort groups in Gunma Prefecture

a. Numbers of cases

<table>
<thead>
<tr>
<th></th>
<th>Before the campaign</th>
<th>During the campaign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-resort group</td>
<td>149</td>
<td>1909</td>
</tr>
<tr>
<td>Resort group</td>
<td>14</td>
<td>103</td>
</tr>
</tbody>
</table>

b. Incident rate adjusted for population size (per 100,000)

<table>
<thead>
<tr>
<th></th>
<th>Before the campaign</th>
<th>During the campaign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-resort group</td>
<td>8.7</td>
<td>111.6</td>
</tr>
<tr>
<td>Resort group</td>
<td>5.6</td>
<td>41.5</td>
</tr>
</tbody>
</table>
Figure 3-a

Go To Travel campaign
Figure 3-b

Go To Travel campaign