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Elderly heat stroke risk indirectly caused by COVID-19

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Introduction

The coronavirus disease 2019 (COVID-19) pandemic has resulted in over 80 million known infections and 1.7 million deaths as of December 2020. Until vaccines or therapeutic medications for COVID-19 become available, many countries and regions are forced to adopt physical distancing measures, such as self-quarantine, lockdowns, and/or stay at home orders/requests to prevent the spread of the disease. However, measures that restrict people's activities may cause unintended health problems owing to a reduction in exercise, as well as mental health problems because of a lack of social contact.

The incidence of heat stroke is a growing health problem that is increasing with global warming. In Japan, older adults account for a high proportion of heat stroke patients, and most of these cases arise in the home. In early summer 2020, concerns were raised that a request to not go outside and the wearing of face masks to prevent transmission might increase the incidence of heat stroke; however, this relationship has not been investigated. In this study, we analyzed emergency transport data from Tottori Prefecture, where the number of COVID-19 cases has been low, to evaluate the indirect effect of COVID-19 measures on the incidence of heat stroke.

Materials and Methods

This study was conducted with data from Tottori Prefecture, which is located in western Japan and has the smallest population (555,663 in October 2019) of all 47 prefectures in the country (**Fig. 1**). The daily number of new COVID-19 cases were obtained from the COVID-19 website of Tottori Prefecture.

The number of daily ambulance transports for heat stroke was obtained from the Department of Health and Welfare of Tottori Prefecture, which identified a total of 426 of these cases from April to October 2020. A total of 1,465 heat stroke cases from April to October for the years 2017 to 2019 combined were selected as the control group. The following parameters were compared between the control cases and the 2020 heat stroke cases: mean age, age structure, and the circumstances of the heat stroke: at home, at work (excluding farm work), during exercise (indoors and outdoors), outside (excluding work), farm work, while watching an outdoor event, during tourist activities, or other circumstances.

Descriptive statistics, one-way analysis of variance, and the $\chi 2$ test were used in the analysis. The significance level was set at 5%.

The study was approved by the Tottori University Ethics Committee (No. 180626-069).

Fig. 1. Location of Tottori Prefecture

Results

The first COVID-19 case in Tottori Prefecture was reported on April 10, 2020, and a total of 38 cases were reported by the end of October 2020. As of the end of October 2020, Tottori Prefecture ranked 46th in Japan for the number of COVID-19 cases (the 45th-ranking prefecture had 68.35 cases per million people) (**Fig. 2**).

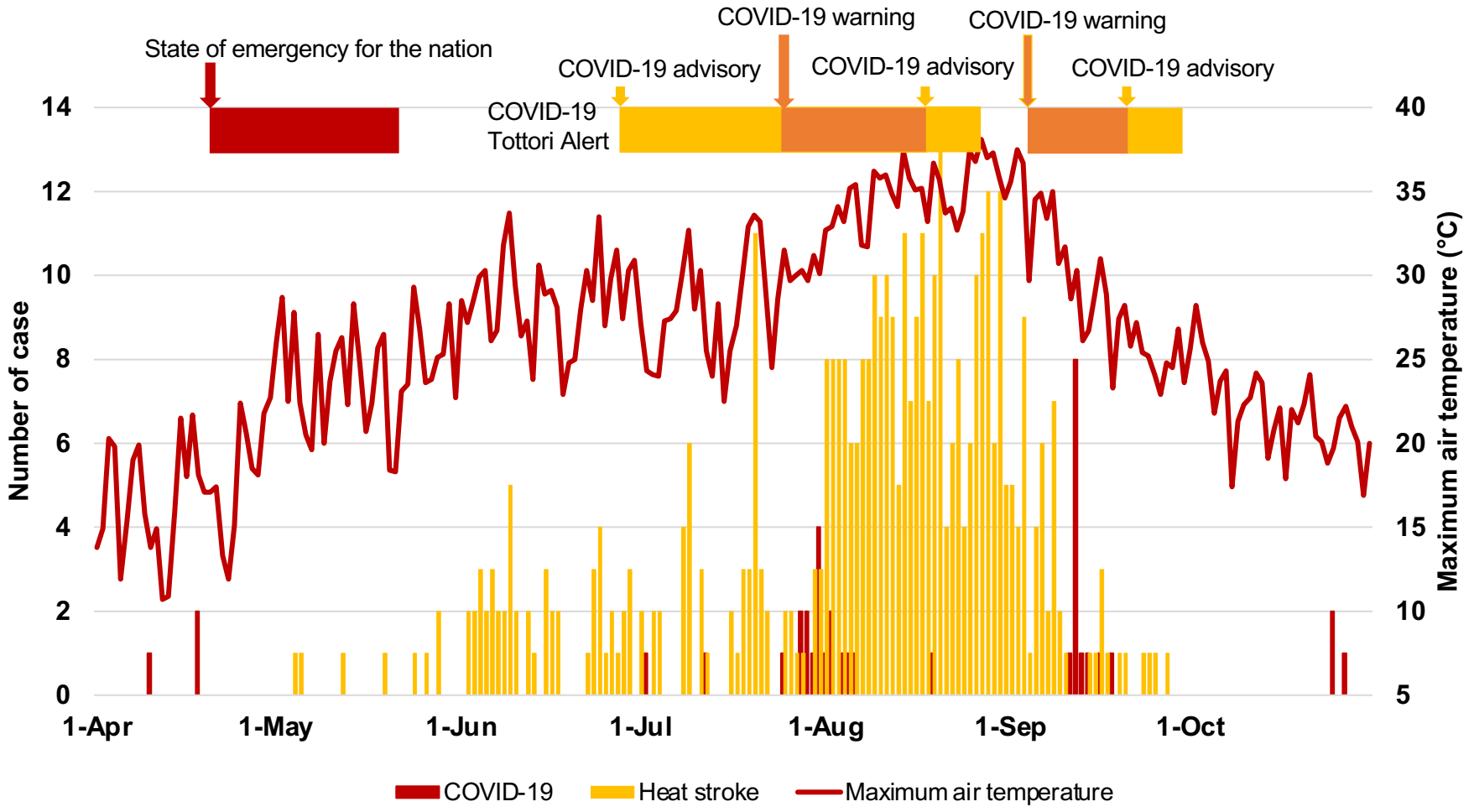

Fig. 2. Trends of COVID-19 cases and emergency transport heat stroke patients in Tottori Prefecture, maximum temperatures in Tottori City, and government-issued for COVID-19

Results

The mean age of of heat stroke-related emergency transport patients from 2017–2020 was 60.0, 57.4, 57.6, and 66.2 years, respectively. The mean age in 2020 was significantly higher than in previous years (**Fig. 3**).

In 2020, the percentage of those under 18 was 8.0%, which was lower than in previous years and the percentage of those over 75 was 47.7%, which was higher than in previous years (**Fig. 4**).

Regarding the circumstances of heat stroke, in 2020, 36.9% of all incidents occurred in the person's residence, which was higher than in previous years (26.6%–29.3%), and 11.3% were associated with exercise, which was lower than in previous years (18.2%–20.4%) (**Fig. 5**).

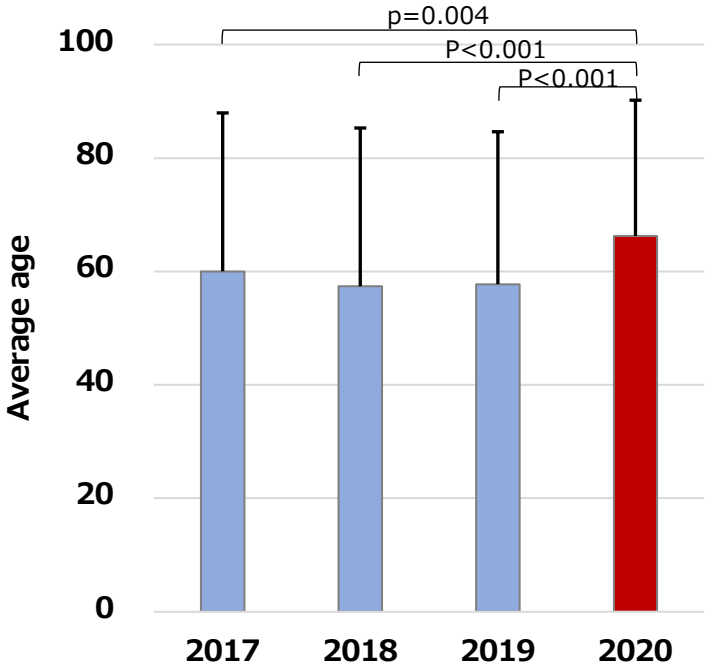

Fig. 3. Average age of emergency cases for heat stroke

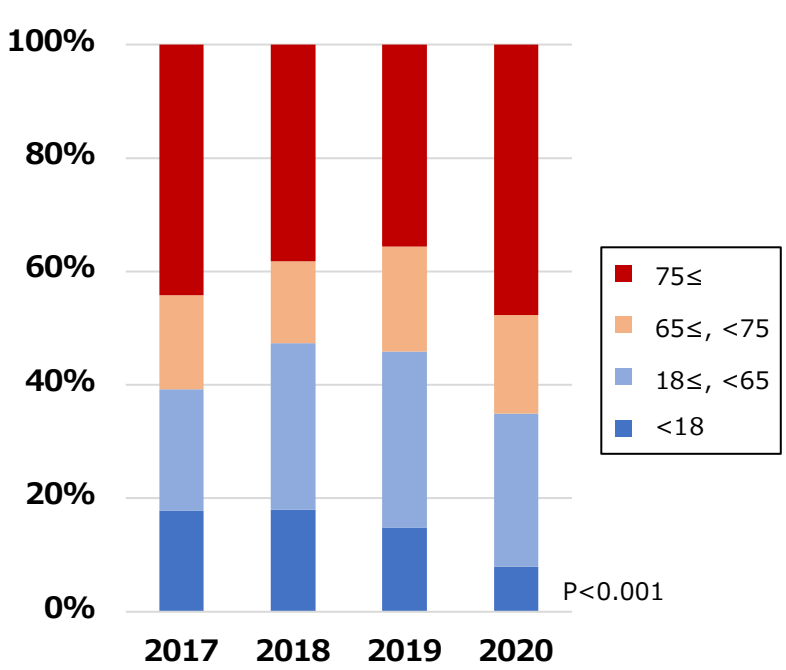

Fig. 4. Proportion of emergency cases for heat stroke by age group

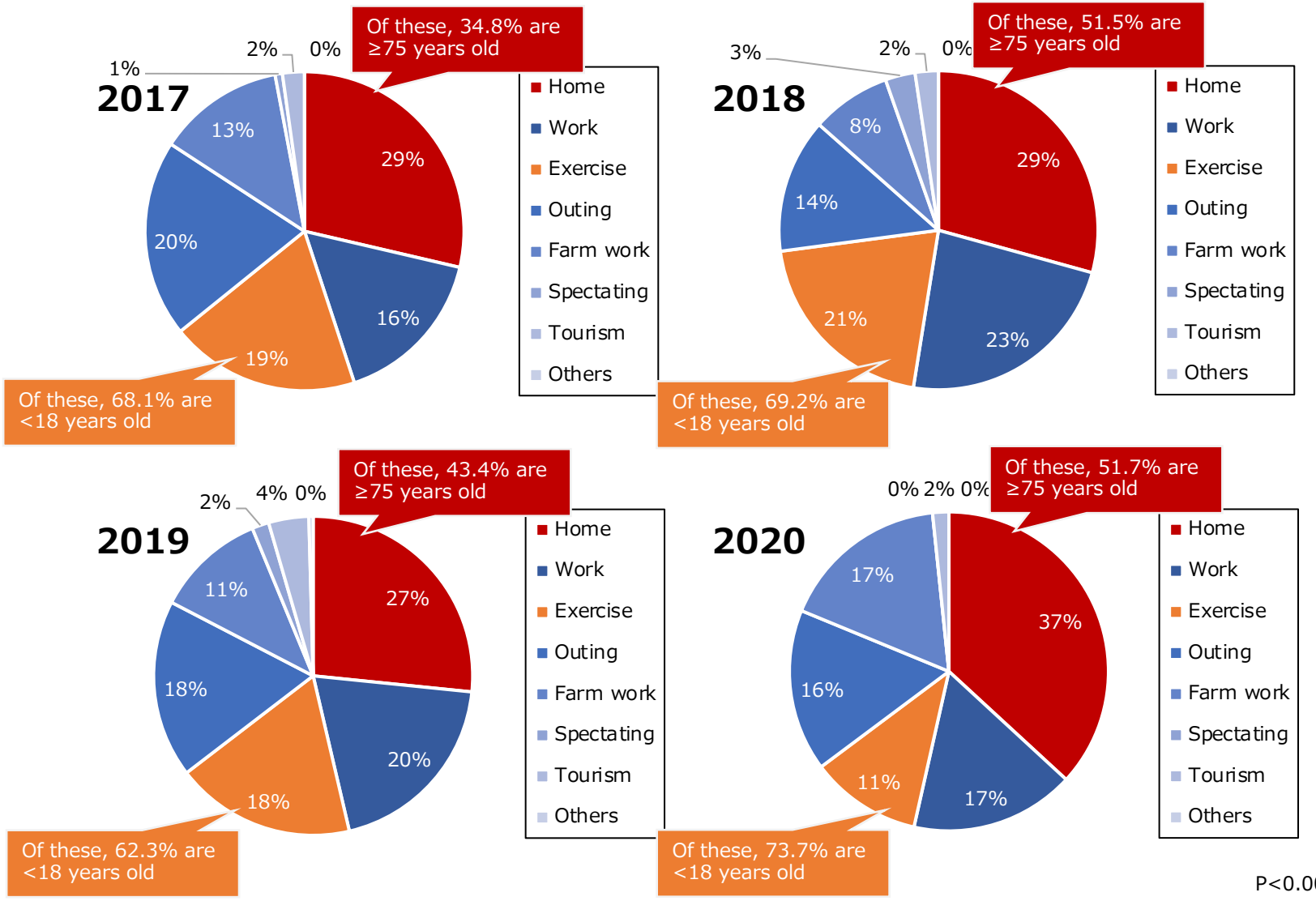

Fig. 5. Heat stroke transport cases by age group (years) and transport circumstances, April–October, 2017–2020

Discussion

The proportion of elderly people among all heat stroke patients has been high in Tottori Prefecture, and this trend was amplified in 2020. In addition, the frequency of heat stroke cases arising in residences was higher than in previous years. Although Tottori Prefecture had very few COVID-19 cases, this pandemic may have indirectly altered the pattern of heat stroke incidence..

Given the pattern in Japan of elderly people suffering heat stroke at home, it can be inferred that not going outside in the summer has had a negative impact on people’s health in hot environments.

According to the information obtained from Tottori Prefecture, there were no reports of heat stroke caused by face masks during the investigated time period. Considering the increased percentage of heat stroke incidents occurring at home, the impact of face masks on heat stroke is considered to be limited.

There are several limitations to this study. Because it included only 4 years of data, it is difficult to say definitively whether 2020 was an aberration. Another limitation is that there is no accurate data on how many people restricted themselves from leaving the residence during the government's request for self-quarantine. Once accurate figures become available, we will be able to assess the risks and benefits of voluntary quarantine aiming to limit the spread of infection.

Conclusion

COVID-19 control measures, such as stay at home requests and the cancellation of events, may have contributed to slowing the transmission of the disease. However, restricting outings may further increase heat stroke risk for those who are typically more susceptible to heat stroke that occurs at home.

Conflicts of Interest: The authors declare no conflict of interest.