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Very low likelihood that cultivated oysters are a vehicle for severe acute respiratory syndrome coronavirus 2 : 2021-2022 seasonal survey at supermarkets in Kyoto, Japan

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Introduction

The pandemic caused by novel coronavirus disease of 2019 (COVID-19) is a global threat. Wastewater surveillance in Japan and abroad has led to the detection of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), causing concern that SARS-CoV-2 in the feces of infected persons may contaminate the aquatic environment. Bivalves such as oysters cultivated in coastal areas are known to filter and concentrate viruses such as norovirus present in seawater in their bodies; however, whether they do so with SARS-CoV-2 is unknown. Therefore, we examined cultivated oysters sold in Japan for the presence of SARS-CoV-2 between October 2021 and April 2022 to clarify the extent of viral contamination and evaluate the risk of food-borne transmission of SARS-CoV-2.

Methods

We examined 145 cultivated oyster samples, consisting of 53 for raw consumption and 92 for cooked consumption, sold at 23 supermarkets in Kyoto from October 2021 to April 2022. The oysters were cultivated and processed in 31 coastal areas in nine prefectures throughout Japan, as the oysters sold in Kyoto supermarkets are purchased randomly. We obtained a vast number of oysters, 81.4% (118/145), from the Seto Inland Sea area (Hiroshima, Okayama, Hyogo and Yamaguchi prefectures), where oyster aquaculture is very popular. Virus concentration and removal of midgut-gland contaminants were performed using a combination of existing authorized PEG precipitation methods according to our reported protocol [1]. Porcine epidemic diarrhea virus (PEDV), known as pig coronavirus, was used to spike midgut-gland samples as a whole process control. The presence of SARS-CoV-2 and PEDV was investigated using a modified polyethylene glycol precipitation method and RT-qPCR.

Results

While all samples spiked with the whole process control were positive, no SARS-CoV-2 was detected in any of the 145 raw oyster samples surveyed, despite a marked increase in infections caused by the Omicron variant from January to April 2022 in Japan.

Conclusions

Our results suggest that with well-developed sewage treatment facilities, consumption of oysters cultivated in coastal areas may not be a risk factor for SARS-CoV-2 outbreaks.