

## Research Letter

# High attack rate of COVID-19 in an organized tour group of vaccinated travellers to Iceland

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Since the spread of SARS-CoV-2 between continents and countries occurred mainly by international travel, banning and reducing air travel was an intervention used by many countries in an attempt to mitigate transmission.<sup>1</sup> Mass vaccination against the SARS-CoV-2, which began at the end of 2020, had substantially lowered the infection rate worldwide.<sup>2</sup> Following the vaccination programme, international travel began to recover, with some restrictions, such as polymerase chain reaction (PCR) testing before flights and masking regulations. Vaccinated travellers had a sense of security that they will not become infected during their travel. Israel was one of the first countries to apply nationwide successful vaccination programme. This was followed by a steep decline in the infection incidence rate<sup>3</sup> and an increase in the number of outgoing Israeli tourists. During June 2021, as in other countries, a fourth wave of the COVID-19 began in Israel, caused mainly by the Delta variant. Though outbreaks during travels were reported,<sup>4</sup> data are lacking regarding infection risk among vaccinated tourist groups. Here we describe an outbreak of COVID-19 among a group of vaccinated Israeli tourists during an organized tour, the exposure and the attack rate. Data collection was approved by the Hadassah Medical Center Ethics Committee (HMO-0582-21).

On 3 August, an organized group of 25 travellers departed from Tel-Aviv to Reykjavik (with a 4-hour connection in Vienna) for a 12-day tour in Iceland. All were vaccinated by two doses of the Pfizer BNT162b2 vaccine (24/25, 96% during January 2021). According with the Israeli regulations, all were tested within 72 hours prior to departure by a PCR for SARS-CoV-2 on nasopharyngeal swab and found negative. In Reykjavik they met the local bus driver (which was vaccinated as well) and used a dedicated bus throughout the entire tour. The tour was

characterized by long bus drives (up to 8 hours at a time), mostly with closed windows due to the low temperatures outside. During these rides the travellers were instructed to wear disposable face masks, with partial compliance. The group had only few indoor contacts with locals or other travellers. On 13 August (the 10th day of the tour), prior to their return flight, a PCR test was performed to all travellers. Surprisingly, 15 out of the 25 (60%) were found to be SARS-CoV-2 positive and were requested to stay in isolation for 10 days in Reykjavik, prior to flying home. The 10 negative travellers returned to Israel; however, upon landing 6 of them tested positive. The four non-infected travellers were quarantined for 7 days with a negative PCR testing on the seventh day. Overall, the attack rate of COVID-19 in this group was 84% (21/25). The single traveller that was vaccinated only a month prior to the trip was also infected. Other characteristics of the infected and the non-infected travellers are presented in the appendix Table (Supplementary Material A1). The driver was asymptomatic throughout the trip, but data regarding PCR results are not available. Epidemiological questioning revealed that several of the infected travellers had mild respiratory symptoms, some also with low-grade fever, between the 6th and 10th day of the trip. The demographic and clinical characteristics of the group members are presented in the Table 1. The median age [interquartile range (IQR)] was 63 (59–67), the travellers had only few comorbidities and none had a known immunosuppression. All the infected persons had a mild course of disease and none were hospitalized. Unfortunately, the positive specimens were not available for sequencing of the viral Spike RNA; thus, the variant involved in this outbreak is unknown. Due to the fact that several travellers were already symptomatic during the trip, we assume that despite the negative

**Table 1.** Characteristics of 25 travellers, vaccinated by two doses of the Pfizer BNT162b2 vaccine

	N (%)
Baseline characteristics	
Age [median (IQR)]	63 (59–67)
Female gender	13 (52)
Medical history	
Diabetes mellitus	8 (32)
Hypertension/Ischemic heart disease	8 (32)
Overweight	5 (20)
Immunosuppression	0 (0)
Past COVID-19 (recovered person)	0 (0)
2-dose vaccination, 6 months prior the trip <sup>a</sup>	24 (96)
Negative PCR test for SARS-CoV-2 within 72 hours before the trip	25 (100)
Clinical course	
Positive PCR test for SARS-CoV-2 at the end of the trip	21 (84)
Symptoms (out of the 21 positive travellers) <sup>b</sup>	
Fever	11 (52)
Cough	13 (62)
Loss of taste/smell	5 (24)
Coryza	3 (14)
Sore throat	1 (5)
Shortness of breath	1 (5)
Asymptomatic	2 (10)
Hospital admission <sup>c</sup>	0 (0)

<sup>a</sup>One traveller received the second dose 1 month before the trip (was infected); another traveller received a third dose 1 day before the flight (was not infected)

<sup>b</sup>Nine travellers (43%) began to have mild symptoms during the trip, between the 6th and 10th day of the trip

<sup>c</sup>One person was repatriated to Israel on a medical evacuation flight but was not hospitalized

PCR test prior the flight to Iceland, one of the travellers acquired the disease already in Israel and was the source of the outbreak. Yet, there was an increase in the incidence rate of COVID-19 in Iceland since mid-July 2021; thus, it is also possible that the infection was acquired during the trip.

The presented outbreak demonstrates that prolonged exposure during travel poses a very high risk for infection, even among vaccinated persons; during a 12-day travel, the attack rate was 84%. This very high breakthrough infection rate might be explained by several factors. First, close and prolonged exposure probably increases the chance that the virus will evade the host immune system, as was described in influenza outbreaks.<sup>5</sup> Second, the effectiveness of the vaccine against infection by the Delta variant is known to be reduced compared with previous variants.<sup>6</sup> Lastly, it may be related to reduced vaccine effectiveness over time, as most of these travellers (24/25, 96%) had completed the two-dose regimen >6 months before the trip.<sup>7</sup> Yet, an increased risk of infection was found among household contacts, even when the common circulating variant was Alpha and also within a short time following the two-dose regimen.<sup>8</sup> This was explained by the intensive and prolonged exposure, similar to the current outbreak, which, in our opinion, makes this factor the most significant. It is worth noting that on February 2020, long before vaccinations, during a long flight from Japan to Israel, carrying COVID-19 patients together with non-infected, no passenger became infected.<sup>9</sup> Probably the much shorter length of exposure and the more prudent use of masks during that flight, lowered the risk of infection. Despite the high rate of infection in the present trip to Iceland, all infected travellers had only mild illness. This probably resulted from the effectiveness of the vaccine in preventing severe COVID-19.

A pre-departure negative PCR test cannot rule out infection in its incubation period,<sup>10</sup> especially when travelling in a large group. In addition, it is challenging to maintain the basic rules of COVID-19 prevention (i.e. masking, social distancing and not crowding indoors) during group travel. Repeated testing for SARS-CoV-2 during a trip by rapid antigen test may be an option, but it depends on the personal will of each traveller. Needless to say, appearance of typical symptoms, even if mild, requires personal responsibility for immediate isolation and PCR testing. Such a behaviour might prevent an extensive outbreak.

When planning a trip during the ongoing COVID-19 pandemic, prudent travellers should consider these risks and use the recommended protective measures (e.g. masking, vaccination, avoiding crowding, travel with a small group, etc.) in order to avoid infection.

### Supplementary data

Supplementary data are available at *JTM* online.

### Authors' contributions

Initiation—S.B.

Data Collection—M.O.

Data Analysis—Y.O., M.J.C., S.B.

Writing—R.N.P., S.B., Y.O.

Critical Review—R.N.P., S.B., M.C., Y.O.

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