

## COVID-19 Outbreak Retrospective Study in a Leisure Trip

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**Preparedness for public health response to the health crisis is vital for every country. Since the beginning of SARS-CoV-2 infection cases, most structures and resources have been focused on mitigating the pandemic. Objective. To describe the characteristics of the people in a leisure trip with a outbreak of COVID-19. Material and methods. An outbreak epidemiological study was designed using retrospective data based on the standardized epidemiological case study on the National System of Epidemiological Surveillance. In Guanajuato State, a covid-19 outbreak was detected in subjects that took a leisure trip to the South of Mexico. The outbreak investigation followed the principles established in the Epidemiological Principles for Disease Control Module 5. Descriptive and exploratory analyses of the data were performed. Statistical analysis: Tests of difference of proportions and risk factors were carried out. The confidence level was set at 95%. Tests with a p-value less than .05 were considered statistically significant. Results. The probable exposure period was determined to be March 24th-March 26th. The number of confirmed cases was 18 (32.1% from 56), with three of them asymptomatics. Meanwhile, the case fatality rate was 22.2% (four of 18 died). Few tests showed statistically significant results. It may be mainly due to the small size and non-randomness of the sample. Conclusion. The people in this leisure trip was of the first outbreak of COVID-19 in Mexican state of Guanajuato.**

**Keywords:** Case Study; COVID-19; Epidemiology; Leisure trip; Outbreak; SARS-CoV-2.

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Surveillance, investigation, and control of risks and damages in public health are essential elements in health systems to promptly detect relevant events that require immediate intervention and control<sup>1</sup>.

A delay in outbreaks detection translates into inadequate preparation and response that aggravates the impact of transmissible diseases, favors an increase in the number of cases, deaths, the duration of the epidemic, and the risk of

spreading. For this reason, in the presence of single or clustered suspected cases that present signs and symptoms of epidemiological interest, they should be subject to the identification process and study of an outbreak to establish immediate containment or mitigation measures<sup>1,2</sup>.

Epidemiological surveillance systems in a territory are essential for timely detection, and health systems must respond immediately within the international regulatory framework<sup>3</sup>.

Since the emergence of SARS-CoV2<sup>4</sup>, structures and resources from public health systems have been focused on detecting, evaluating, notifying, investigating, intervening, communicating, and containing health risks associated with the coronavirus disease 2019 (COVID-19)<sup>5,6</sup>.

An outbreak study for SARS-CoV-2 was carried out in Guanajuato since a cluster identification with the data registered in the database of the National Epidemiological Surveillance System (NESS) of the General Directorate of Epidemiology of the Ministry of Health<sup>7</sup>.

This paper aims to review an outbreak study that took place in central Mexico as a case study to be used as a learning tool since it describes each of the stages and clinical, epidemiological, and statistical procedures performed in an outbreak study. Likewise, risk factors for an outbreak of SARS-CoV-2 among residents of the state of Guanajuato who made a recreational trip during the beginning of the COVID-19 pandemic in Mexico will be analyzed.

## MATERIAL AND METHODS

**Study design:** An outbreak epidemiological study was designed using retrospective data based on the standardized epidemiological case study on the NESS platform. The outbreak was detected among the participants of a leisure trip from March 16th to March 26th. For this study, we included all the records and deleted the registries with incomplete data.

### Outbreak study

The outbreak study started with four suspected cases of severe acute respiratory illness detection in a local hospital. On the same day, nasopharyngeal samples were taken and sent for testing for SARS-CoV-2 presence by the rtRT-

PCR technique in the Public Health Laboratory from Guanajuato State. All four index cases were positive for SARS-CoV-2. The Rapid Response Team began searching for suspected SARS-CoV-2 cases among the other members on the bus. Of 58 passengers, 56 were located and was carried out the cluster investigation. The outbreak investigation followed the principles established in the Epidemiological Principles for Disease Control Module 5<sup>8</sup>.

### Data analysis

Descriptive and exploratory analyses of the data were performed. Tests of difference of proportions and risk factors were carried out. The confidence level was set at 95%. Tests with a p-value less than .05 were considered statistically significant. The calculations were carried out using EPIDAT 3.1 and 4.2 and the statistical software R 3.6.3. Pearson's Chi-square test was used for the difference in proportions.

In addition, the epidemiological curve was designed, which was used to establish the probable period of exposure and the identification of the primary case.

## RESULTS AND DISCUSSION

The From the epidemiological investigation, the following was determined. During the trip, five tourist spots were visited in the South of Mexico.

March 16 point 0 to 1: The journey from the beginning to the first point to visit took 16 hours. After visiting this place, the passengers slept on the bus to go to the second place.

March 17-20 points 1 to 2: They stayed four days and three nights in a hotel during the visit to the second point.

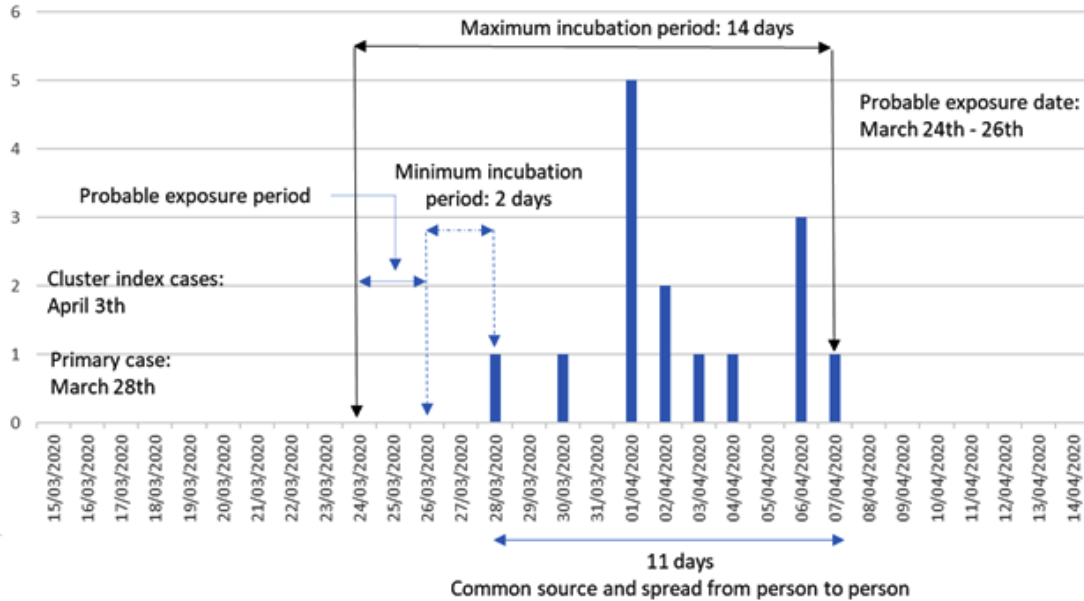
March 21-22, point 2 to 3: they stayed two days and one night in a hotel.

March 23-24 point 3 to 4: they stayed two days and one night in a hotel.

March 24-25 point 3 to 4: they stayed two days and one night in a hotel.

March 25-26: they returned to their place of origin at 01:30 hours after a 13-hours journey.

During the trip, several stops were made without specifying the arrival sites, some of them being self-service stores. The bus was not cleaned during the trip. At the end of the trip, the bus was



**Fig. 1.** Epidemic curve with exposure period

Source: Elaborated by the authors based on the outbreak investigation data

**Table 1.** Basal characteristics of the subjects in the leisure trip

Variable	Confirmed case of COVID-19		Non-confirmed case of COVID-19(df)		Chi-squared p-value
	n	%	n	%	
Sex					1.0879 (1) 0.2969
Male	11	61.1	16	42.1	
Female	7	38.9	22	57.9	
Age group					3.2513 (1) 0.07137
Above 60	12	66.7	14	36.8	
Under 60	6	33.3	24	63.2	
Diabetes					0.72899 (1) 0.3932
Yes	3	16.7	12	31.6	
No	15	83.3	26	68.4	
Hypertension					<0.0001 (1) 1
Yes	5	27.8	10	26.3	
No	13	72.2	28	73.7	
Smoking					0.57651 (1) 0.4477
Yes	4	22.2	4	10.5	
No	14	77.8	34	89.5	
COPD					- (-) -
Yes	0	0	0	0	
No	38	100	18	100	
Obesity					0.047453 (1) 0.8276
Yes	5	27.8	8	21.1	
No	13	72.2	30	78.9	

df: degrees of freedom COPD Chronic Obstructive Pulmonary Disease  
 Source: Epidemiological study by the Sanitary Jurisdiction IV

**Table 2.** Present symptoms among the subjects confirmed to COVID-19

Symptom	n	%
Fever	8	44.4
Cough	12	66.7
Headache	12	66.7
Dyspnea	5	27.8
Diarrhea	3	16.7
Thoracic pain	3	16.7
Chill	7	38.9
Odynophagia	5	27.8
Myalgias	5	27.8
Arthralgias	3	16.7
Rhinorrhea	6	33.3
Polypnea	4	22.2
Vomiting	0	0
Abdominal pain	0	0
Conjunctivitis	0	0
Cyanosis	1	5.6

Source: Epidemiological study by the Sanitary Jurisdiction IV

disinfected without using the proper personal protective equipment. Both drivers stated that, during the trip, they did not detect anyone sick or with respiratory symptoms person among the passengers.

The number of confirmed cases was 18 (32.1% from 56), with three of them asymptomatics. Meanwhile, the case fatality rate was 22.2% (four of 18 died).

The onset of symptoms among the subjects was from March 28th to April 7th. Being the maximum incubation period equal to 14 days, and the minimum incubation period equivalent to 2 days, the probable exposure period is March 24th-March 26th (Graph 1).

Table 1 shows that none of the variables has a statistically significant association with confirmation status to SARS-CoV-2. Nevertheless, the greater frequencies and percentages values correspond to those above 60 years and males, compared to the present for the non-confirmed cases.

Table 2 shows that the more common symptoms among the confirmed cases of SARS-CoV-2 were cough and headache (66.7%). On the other hand, there were no reports of vomiting, abdominal pain, or conjunctivitis.

**Table 3.** Distribution of hospitalized patients and outcome

	Death		Non-death	
	n	%	n	%
Patient type				
Hospitalized	4	100	2	14.3
Outpatient	0	0	12	85.7

Source: Epidemiological study by the Sanitary Jurisdiction IV

It is worth noting that all the registered deaths were among those who were hospitalized. Most of the confirmed cases received ambulatory treatment (66.7%)

## DISCUSSION

The number of confirmed cases was 18 (32.1% from 56), with three asymptomatics. Meanwhile, the case fatality rate was 22.2% (four of 18 died). Compared to the corresponding numbers in the Diamond Princess outbreak, 712 (20% of 3711) and 1.8% respectively reported by Tokuda Y<sup>9</sup>, the outbreak described in this study shows how dangerous are the outbreaks in closed spaces among older people.

These results are in line with McMichael *et al.*<sup>10</sup> where is reported the high impact of a covid-19 outbreak in a long-term care facility.

All the confirmed cases that died were hospitalized (Table 3). This phenomenon could be attributable to the age that predominated among the confirmed cases. Most of the confirmed cases were above 60 years (66.7%) compared with those among the non-confirmed cases (36.8%) (Table 1).

The symptoms that predominated among the confirmed cases were cough and headache (66.7%), followed by fever (44.4%), which are consistent with the reported by Guan *et al.*<sup>11</sup>.

Few tests showed statistically significant results. It may be mainly due to the small size and non-randomness of the sample. Due to these constraints and the need of information for decision-making, it is advisable to conduct descriptive and exploratory data analysis in a conservative way. In early outbreaks continuous surveillance is of key importance for gathering

information and generate knowledge about the developing disease.

### CONCLUSION

A high infection rate and a high case fatality rate were observed. Although none of the associations were statistically significant, age over 60 years, and being male, predominated among the confirmed cases to SARS-CoV-2. The time that the subjects shared in the bus seems to be the reason behind the high number of infected subjects. According with the epidemiological investigation the probable period of exposure was between March 24th and March 26th, approximately at the end of the trip.

At this time, in Guanajuato state were reported the first cases of COVID-19.

With the presence of this outbreak, the civil authorities from Guanajuato state, began to re-convert hospitals to attended patients with COVID-19; also dictated isolation, no public shows, close of restaurants, bars and other places of public meetings.

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#### Conflict of Interest

All authors declare that they have no conflicts of interest of any kind.

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