Correlation Between Weather and COVID-19 Pandemic During Ramadhan 1441 Hijriyah in Padang City

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ABSTRACT

The highest number of COVID-19 cases in West Sumatra province was found in Padang City. Some researchers claim that temperature significantly affects the transmission of COVID-19. This study aims to analyze the relationship between weather and the COVID-19 pandemic during Ramadan 1441 Hijriyah in Padang City. The research used secondary data in the form of COVID-19 surveillance data, namely the number of patients who were confirmed positive for COVID-19 from the Padang City Health Office and the weather from the Padang City Meteorology and Climatology Agency. Weather components include minimum temperature (°C), maximum temperature (°C), average temperature (°C), humidity (%), and the amount of rainfall (mm). Data analysis used Spearman correlation. The results showed that the maximum temperature, average temperature, humidity, and rainfall had a significant relationship with COVID-19 cases during Ramadhan in Padang City.

Keywords: Correlation, Weather, COVID-19, Ramadhan 1441 Hijriyah, Padang City.

INTRODUCTION

WHO has declared COVID-19 a public health emergency after spreading to several countries outside China. It has spread globally, and there are approximately 1,279,722 confirmed cases and 72,614 deaths in total as of 8 April 2020, worldwide[1]. According to WHO, common symptoms of COVID-19 infection include fever, fatigue, dry cough, shortness of breath, aches, pains, and sore throat. Due to its contagious nature, COVID-19 has affected people's lives and significantly restricted their movement[2]. To prevent or minimize the spread of the virus, in Padang City, as in some urban districts in Indonesia, large-scale social restrictions or also known as PSBB are imposed, it is stated that people cannot go out unless necessary. In addition, people are not allowed to enter some cities except in mandatory situations. These measures indicate the severity of the situation and that the virus is being carried through mobility[2].

Indonesia occupies number 26 of all countries in the world with 11,587 positive cases and 864 deaths. West Sumatra is one of the provinces in Indonesia affected by COVID-19, including the 10 provinces with the highest cases of positive cases 203, and 15 deaths, of which Padang City is the center highest spread of COVID-19[3].

COVID-19 should be watched out for because of the relatively fast transmission, a mortality rate that cannot be ignored, and there is no definitive therapy[4]. Recent studies confirm that COVID-19 is transported and propagated through humans[5 6 7 8] claim that COVID-19 has spread through human-to-human transmission through direct contact and droplets. In addition, certain climatic conditions can be considered top predictors of respiratory diseases such as SARS. Climate variables can also be a direct cause of biological interactions between SARS-CoV and humans.

Optimal temperature, humidity, and wind speed are variables that can determine the survival and transmission of the SARS virus[9].

The main objective of this research is to analyze the weather and the COVID-19 pandemic during Ramadhan 1441 Hijriyah in Padang City. This research considers several variables, namely: minimum temperature, maximum temperature, average temperature, average humidity, rainfall, and the number of patients who were confirmed positive for COVID-19 that occurred during Ramadhan.

METHODS

Padang City is the capital city of West Sumatra province, which geographically, it is found at longitude 100º05'05' – 100º34'09'' E and latitude 00º44'00 '- 01º08'35' S (Fig 1) with has an area of 69,496 ha. Based on the 2010-2035 population projection by the Central Bureau of Statistics, it is then processed by the Data and Information Center of the Ministry of Health of the Republic of Indonesia and the Padang City Health Office. In 2019, the target population is 950,871, with the male population being more than the female population with an average number of people/household being 4.5 people[10].
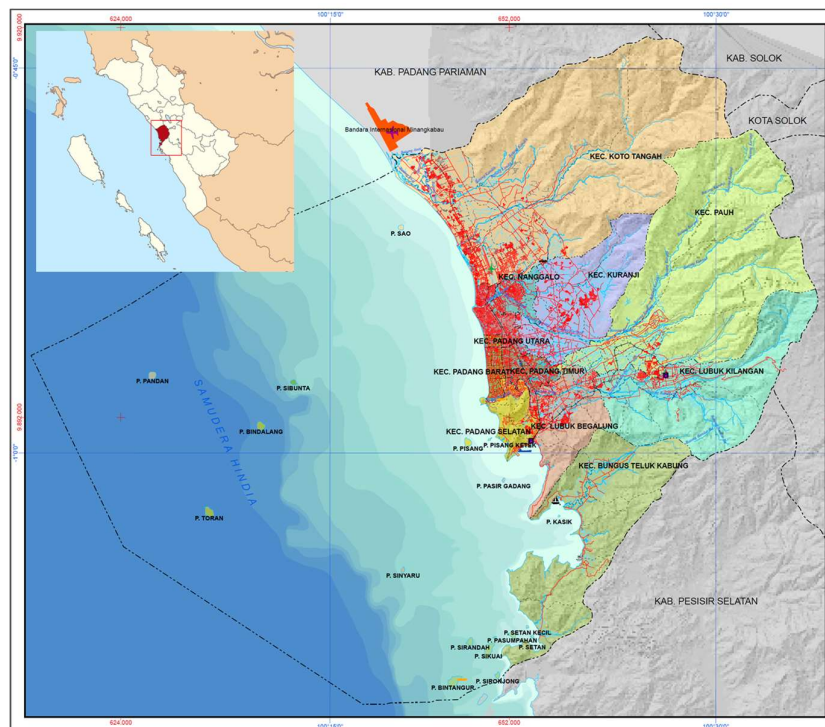

Figure 1. Map of Padang City - Indonesia

This research was conducted in Padang City, West Sumatra Province, Indonesia. This type of research is descriptive and quantitative by conducting a systematic data search. In this study, several variables were used, namely: minimum temperature, maximum temperature, average temperature, average humidity, rainfall, and the number of patients who were confirmed positive for COVID-19 in Padang, West Sumatra. This data was obtained from the Padang City Health Office and the weather from the Padang City Meteorology and Climatology Agency from 23

April 2020 to 24 May 2020 during the month of Ramadhan 1441 Hijriyah. The analysis used in this study is the Spearman correlation because the data used are not normally distributed.

RESULT

From Fig 2, information is obtained that the highest number of positive cases of COVID-19 in Padang City is 308 cases and the least is 58 cases per day. Meanwhile, the highest number of deaths per day was 17 cases and at least 8 cases died per day. The total number of people under surveillance (ODP) during this study was 68 cases each day.
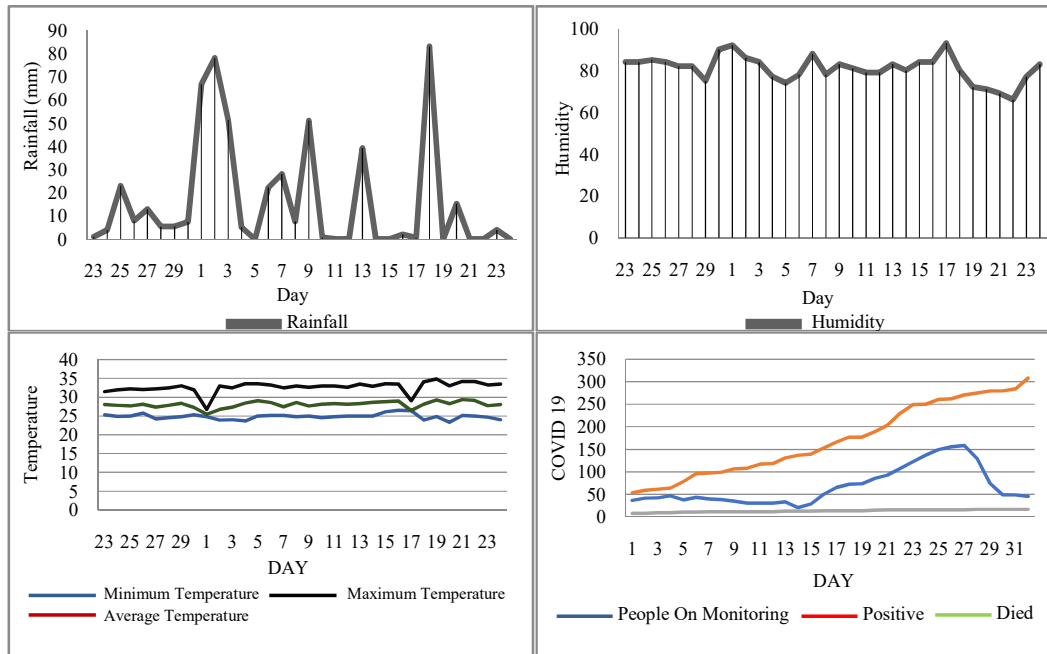

Figure 2. Rainfall, Humidity, Minimum Temperature, Maximum Temperature, Average Temperature, and COVID-19 cases

From the results of the correlation analysis, it can be seen that the maximum temperature, average temperature, humidity, and rainfall have a significant relationship with the COVID-19 case in Padang City. So that the four variables correlate with the COVID-19 case.

Table 1. Analysis of weather spearman correlation in the COVID-19 pandemic during Ramadhan 1441 Hijriyah in Padang City

Weather variable	Spearman's Correlation
MinimumTemperature	-,050
MaximumTemperature	0,669*
Average Temperature	0,431*
Average Humidity	-,440*
Rainfall	-0,4*

*. Correlation is significant at the 0.05 level (2-tailed).

According to[11] variations in temperature and humidity may be an important factor affecting COVID-19 mortality. And in this case, the maximum temperature is the factor that has the

strongest correlation with the correlation case, while the average temperature, humidity, and rainfall have a moderate correlation with the COVID-19 case.

This correlation is in line with previous studies showing an association between weather transmission and Syncytial Virus Respiration (RSV)[12]. Temperature is also an environmental driver of the COVID-19 outbreak in China[13]. The regression equation shows how temperature, relative humidity, and wind speed affect SARS transmission[9].

To compare the results of this study with other studies, the latest research is considered first. [14]suggested that average temperatures are significantly correlated with COVID-19. However, it is claimed that minimum and maximum temperatures, rainfall, and humidity are not significantly correlated with COVID-19. In research by[2], the mean temperature was found to correlate with COVID-19 as well. The correlation coefficient is higher (rs = .40,483) compared to that in the study by[14] where the coefficient value of rs = 0.392.

The research[15] analyzed the correlation between temperature and COVID-19 infection in China and claimed that the average temperature and the number of COVID-19 cases had a positive linear relationship when temperatures were below 3°C. [11]also examined the impact of temperature and humidity variations on COVID-19 deaths and stated that these parameters influence COVID-19 deaths. [16]analyzed the relationship between meteorological parameters and the severity of the spread of COVID-19 on a world scale and claimed that wind speed, temperature, and relative humidity were effective factors. [17]analyzed the impact of temperature on the spread of COVID-19 and claimed that temperature significantly affects the transmission of COVID-19.

Moreover, [18]investigated the link between acute respiratory syndrome (SARS) transmission and the weather in Beijing and Hong Kong during the 2003 epidemic to uncover the impact of weather on SARS transmission. The results of that study revealed that there was an inverse correlation between the number of cases and temperature. These findings are consistent with those in this study, where the temperature was inversely correlated with the number of COVID-19 cases. Likewise in another study conducted by[19], it was claimed that higher temperature and higher relative humidity (eg, 38°C and N95% relative humidity) diminished virus viability. These results are consistent with the results found in this study, which show that humidity and temperature are inversely correlated with COVID-19 cases.

CONCLUSION

From the results of the correlation analysis, it can be seen that the maximum temperature, average temperature, humidity, and rainfall have a significant relationship with the COVID-19 case in Padang City. So that the four variables correlate with the COVID-19 case. And in this case, the maximum temperature is the factor that has the strongest correlation with the correlation case,

while the average temperature, humidity, and rainfall have a moderate correlation with the COVID-19 case.

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