



HUMIDITY AND SPREAD OF THE COVID-19 AT SAUDI ARABIA (KSA)

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AUTHORS' CONTRIBUTIONS

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ABSTRACT

The effect of humidity on the spread of corona virus (COVID-19) is studied through analysis some of data taken from Ministry of health and from Weather Station homepages of KSA with taken into considerations the relation between number of infected people at the area of low humidity like (Riyadh and Al Qassem) and at the area of high humidity like (Jeddah and Dammam) in the time between Mar-2020 to Jul-2021. The percentage of infected people to total people is calculated at this different four areas, the data under consideration is analyzed by some of programs like Excel which helps us for this analytical study.

Keywords: Covid-19; corona viruses; humidity; corona disease; infection at KSA.

1. INTRODUCTION

Firstly, it comes at World Health Organization that the (Covid-19) and influenza viruses have a similar disease presentation that's while, they both cause respiratory disease and presents as a wide range of illness from asymptomatic or mild through to severe disease and death [17 March 2020, Q&A, World Health Organization]. In many countries, the recent coronavirus (Covid-19) pandemic is having a major effects and needs to be faced with the highest degree of scrutiny. An important piece of information is that the growth rate of the confirmed cases among the population could decrease with increasing temperature. Temperature is arguably the most important abiotic factor that affects all organisms, having both direct and indirect effects on physiology and life history traits [1]. The coronavirus disease (Covid-19) pandemic is a major threat to global

health, several studies indicate that the transmission of (Covid-19) is affected by temperature and it is found that an inverse correlation between temperature and the daily number of infections [2–8]. On the other hand one of researchers is aimed to determine the association between average temperature and humidity with (Covid-19) pandemic in Bangladesh, he was states that the high temperature and high humidity reduces the transmission reduces of (Covid-19), respectively [9]. Other research was explore the correlation between meteorological parameters and (Covid-19) pandemic in New Jersey at United States, the study was examines the effects of air pollutants and humidity on the (Covid-19) spread in New Jersey [10]. No evidence found about the relationship between (Covid-19) cases and temperatures, it is important to account for non-meteorological, spatial and temporal effects [11]. A (Covid-19) outbreak emerged at Wuhan in China at the end of 2019 and developed into a global pandemic during March 2020,

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temperature is an environmental driver of the (Covid-19) outbreak in China, and it is found that the incidence of (Covid-19) decreases with increase of temperature [12]. Projections for (Covid-19) pandemic in India and effect of temperature and humidity was studied at [13]. Temperature dependence of (Covid-19) transmission, (Covid-19) spread is slower at high Temperature in all datasets with high significance [14]. Effect of weather on the spread of (Covid-19) at US was studied through the daily data collected for the new cases in fifty states at US in the time between Jan 1 and Apr 9, 2020 and also the corresponding weather information of temperature and absolute humidity [15]. Other studies was shown that ambient temperature may influence the spread of novel coronavirus [16]. Effects of temperature variation and humidity on the death of (Covid-19) in Wuhan, China, was examined at [18], it was explore the association between Corona Virus Disease 2019 (Covid-19) deaths and weather parameters [17]. Humidity was the best predictor of (COVID-19) transmission [18]. Air pollution and temperature are associated with increased (Covid-19) incidence, i.e. temperature seems to decrease the incidence of (Covid-19) [19]. All of the previous studies encourage us to find the link between humidity and Covid-19 spread at Saudi Arabia (KSA) while it is much more different humidity at different KSA regions.

This paper investigates the impact of Humidity on (Covid-19) transmission. The study uses an extensive monthly panel data sets with applying study analysis to find the potential link between the numbers of confirmed new cases by (Covid-19) and the level of humidity across some regions of KSA.

2. METHODS

The KSA population of (Covid-19) cases and attributable deaths and disease from the time between Mar-2020 to Jul-2021.were analyzed. The data of confirmed new cases by (Covid-19) over all Saudi Arabia and at different region of different humidity at Saudi Arabia is taken from Ministry of health and Weather Station of KSA homepages. The paper is organized as follows. Section I, provides a literature review; in section II, we explain our methods, section III, shows data and sample selection strategy; in section IV, we show the results of our analysis and draw data; at section V, presents discussion and conclusion, while the references at section VI.

3. DATA AND SAMPLES OF SELECTION

Table 1. Show the data taken from Ministry of Health homepage at KSA for number of infected people by Covid-19 at different months in the time between Mar-2020 to Jul-2021.

Table (2) show that data taken from ministry of health homepage at KSA for the number of infected people by Covid-19 at different region at KSA in the same period of time of Table 1

By Table 1 and Table 2 it is easy to notice that the number of infected people at summer are less than that at winter, also the number of infected people by (Covid-19) at the area of low humidity like (Riyadh & Al Qaseem) are more than that at area of high humidity like (Jeddah & Dammam).

Table 1. Number of infected people by Covid-19 at different months in the time between Mar-2020 to Jul-2021

Time	No. of infected	time	No. of infected	Time	No. of infected
3/2020	1563	9/2020	18990	3/2021	16624
4/2020	12368	10/2020	12777	4/2021	26330
5/2020	62508	11/2020	10178	5/2021	33074
6/2020	94911	12/2020	5381	6/2021	37056
7/2020	80188	1/2021	5333	7/2021	38136
8/2020	38153	2/2021	9309		

Table 2. Number of infected people by Covid-19 at different region at KSA in the time between Mar-2020 to Jul-2021

Name of region area	No. of people	No. of infected people	Percentage of infected people%
Riyadh	7.23 M	126551	1.7 %
Jeddah with(Makah)	9.26 M	126725	1.13 %
Al- Qassem	1.0095 M	19321	1.9%
East region with(Dammam)	8.229 M	115709	1.44 %

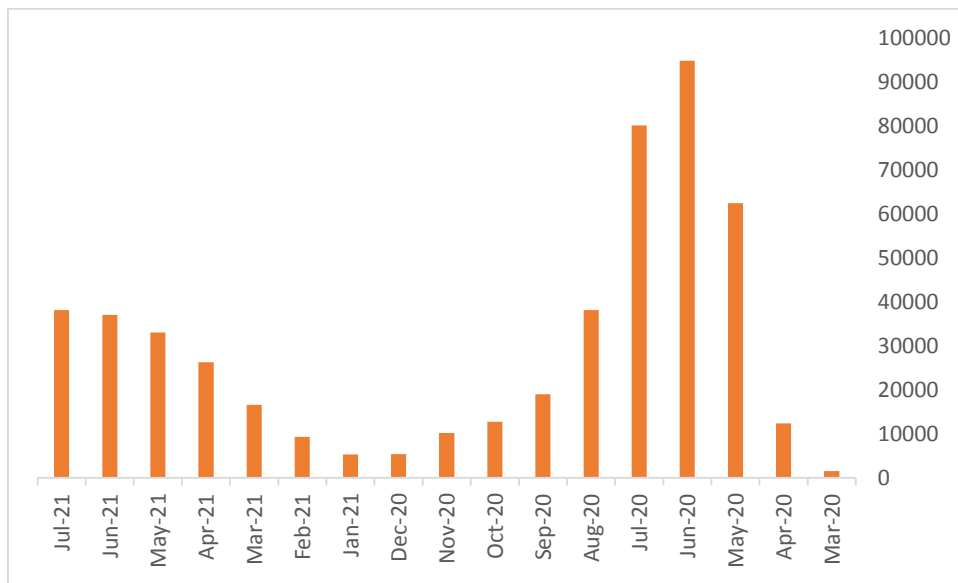


Fig. 1. No. of infected people at KSA in the time between Mar-2020 to Jul-2021

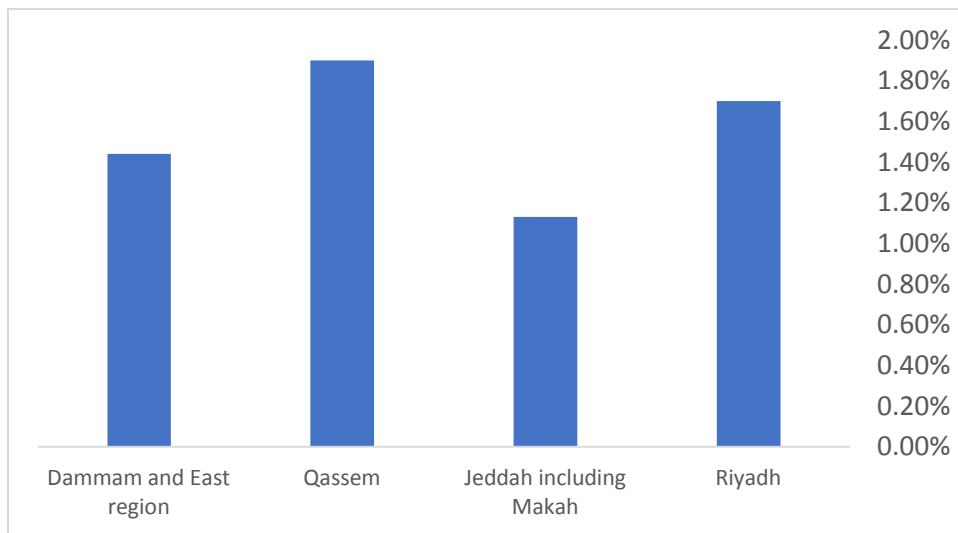


Fig. 2. Percentage of infected people % at some different area in KSA

Table 3. Average humidity at different region of KSA over one year

Time	Jeddah	Riyadh	Qassem	Dammam
Jan	60%	50%	40%	77%
Feb	60%	40%	35%	76%
Mar	60%	37%	32%	75%
Apr	58%	35%	30%	72%
May	55%	22%	20%	68%
Jun	58%	15%	12%	68%
Jul	52%	17%	13%	70%
Aug	60%	15%	13%	70%
Sep	68%	18%	15%	72%
Oct	66%	25%	20%	75%
Nov	64%	37%	25%	78%
Dec	62%	45%	30%	82%

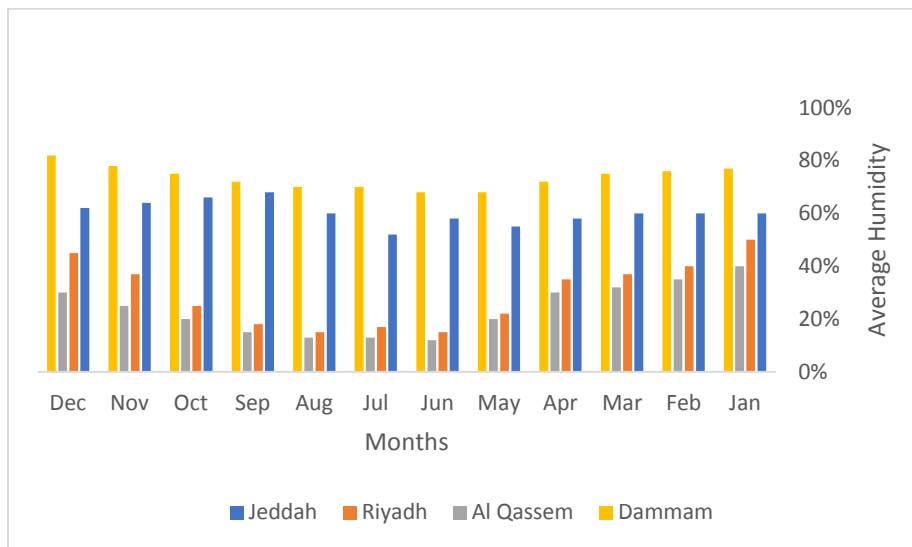


Fig. 3. Average humidity at different region in KSA

At Fig. 1 the data from Table 1 is drawn to find the relation between no. of infected people with different months through over KSA in the time between Mar. 2020 and Jul. 2021.

At Fig.2 we drew a relation between the Percentage of (COVID-19) infected people with the different region which under consideration of study at KSA; Jeddah, Riyadh, Al Qassem and Dammam,

Data taken from Weather Station of KSA gives us the average monthly relative humidity over the year in Jeddah, Reyadh, Al Qassem, and Dammam at Saudi Arabia. It is show that the average humidity at Jeddah and Dammam are much more than that at Riyadh and Al Qassem as in the next Table 3.

At Fig.3, we used data at Table 3 to show that the average humidity measured over one year at different region of KSA.

Fig. 3 show that the relative humidity at Jeddah and Dammam regions are very high as compared with the relative humidity at Riyadh and Al Qassem regions.

By Fig.1, 2, 3. We found that the relative humidity at Jeddah and at Dammam is high compared with the relative humidity at Riyadh and Al Qassem, while the number of infected people by (Covid-19) at Riyadh and Al Qassem are Much more than that at Jeddah and Dammam, this means that the number of disease by (Covid-19) are inversely proportional to the relative humidity. This result of our study in agreement with other studies [9, 10, 15, 17, and 18] at other countries over the world.

3. DISCUSSION AND CONCLUSION

(Covid-19) has become a pandemic. The influence of meteorological factors on the transmission and spread of (Covid-19) is interested. This study sought to examine the associations of monthly average relative humidity (ARH) with the monthly count of (Covid-19) cases in KSA (from Mar-2020 to Jul-2021). The main route of transmission of (Covid-19) infection is presumed to be respiratory droplets. However the virus is also detectable in other body fluids and excreta. The stability of the virus at different temperatures and relative humidity at different area is studied for over one and half year. The better stability of (Covid-19) at low temperature and low humidity environment may facilitate its transmission in community in subtropical area (such as Riyadh and Qassem). It may also explain why some KSA of area in tropical area (such as Jeddah and Dammame) with high temperature and high relative humidity environment did not have major community outbreaks of Covid-19). Data taken from homepage of Ministry of Health at KSA to count the monthly new cases infected by (Covid-19) at different region, and also data taken from Weather Station of KSA to count the average humidity over one year in the same different region of KSA. By drawing of that data we found relation between the infected people by (Covid-19) at some area and the relative humidity of that area in KSA, it is found that the no. of patients in the area of high relative humidity like Jeddah and Dammam are small in compared with the number of patients at the area of low relative humidity like Riyadh and Al Qassem, and it is easy to say that the number of infected people by (Covid-19) are inversely proportional to the relative humidity.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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