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# Influences of meteorological factors on COVID.19 pandemic: prevalence and outcomes

## Abstract

In late of 2019 Coronavirus pandemic started from China (Wuhan Province) and then later spread to the world. The authors set forth a debate about the most important factors which influenced the feast and even the consequences of COVID-19 and then the foresight of COVID-20, which is the climate change and its related meteorological factors. Climate change found to affect directly on virus activation and indirectly on the host behavior and even immune response. Persons live in cold, arid and air polluted areas suffer from both spreads of the pandemic and serious complications of the COVID19 infection, due to low level of vitamin D, low activity of thyroid gland, with low levels of thyroid hormones (T3,T4 and TSH) and reduction in angiotensin 2 level. Aged persons living in these zones are the most victims from this pandemic. We conclude that persons living in the industrialized countries zones are affected more than those under the same meteorological circumstances in non-industrialized countries due to low air pollution.

**Keywords:** meteorological factors, climate, weather, COVID.19, SARS COV-2

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## Background

Humans have recognized that weather circumstances affect epidemic ailments from long before the role of infectious agents was discovered, late in the nineteenth century. Roman aristocrats retreated to hill resorts each summer to evade malaria. South Asians learnt early that, in high summer, strongly peppery foods were less likely to cause diarrhea.

There are three classes of research into the connections between weather circumstances and infectious ailment transmission. The firstly inspects proof from the fresh past of associations between weather erraticism and infectious ailment occurrence. The second looks at early indicators of already-emerging infectious disease impacts of long-term climate change. The third uses the above evidence to create predictive models to estimate the future burden of infectious disease under projected climate change scenarios.

There is much indication of relations between weather circumstances and infectious ailments. Malaria is of abundant public health concern, and appears likely to be the vector-borne sickness most sensitive to long-term weather alteration. Malaria fluctuates seasonally in highly endemic zones. Primary influences of weather alteration comprise numerous infectious ailments, health effects of temperature extremes and influences of extreme weather and climate events. The foremost kinds of models used to prediction upcoming weather impacts on infectious ailments comprise statistical, process-based, and landscape-based models.[1]

Weather alteration can disturb human health, particularly when infectious ailments are concerned. Three parts are vital for most infectious diseases: a pathogen, a vector and transmission environment. Suitable environment and climate circumstances are essential for the existence, multiplication, spreading and transmission of ailment pathogens, vectors, and hosts. So, variations in environment or climate circumstances may influence infectious ailments by affecting the pathogens, vectors, hosts and their living environment.[2]

Respiratory tract contagions are the most spread reasons of infection, and viruses account for the mainstream of these infections, resulting in a significant levels of morbidity and mortality. Emergency rooms (ERs) assist as the frontline for patients at highest risk for respiratory infection ailments, particularly since of the grave nature of these ailments.

Several theories have been advanced to clarify the exact consequence of humidity and temperature on the marked seasonality of influenza and, to a lesser degree, ailment triggered by RSV and other respiratory viruses. These comprise alterations in host behavior (for example, more time spent indoors, in closed environments, throughout cold or rainy climate), variations in host immune responses and variations in the virus infectivity and steadiness in dissimilar environments.[3]

The commonness of respiratory viral infection (RVI) in adults admitted to the ER is mainly unfamiliar, as most pertinent data concern infants and children. RVI can be serious in aged patients, particularly in those with primary respiratory or cardiac disease. Through winter months, RVI can account for several of the admissions to hospitals.[4] Variations in the occurrences of extreme heat and cold, the incidences of floods and droughts, and the grade of local air pollution and aeroallergens will directly touch population health.[5]

Before one month of 2020, an epidemic of pneumonia with anonymous cause started in China's Hubei Region, growing international health concerns because of the easiness of transmission.

To fast examine and control the very infectious disease, supposed persons were isolated and diagnostic/therapeutic procedures were established via patients' epidemiological and clinical data. After numerous investigations, a sole severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) was documented as the causal agent of the ailment, and the disease was called "coronavirus-19" (COVID-19) by Chinese Scientist. Up to date, the SARS-CoV-2 infection is still scattering, and it poses a serious threat to community health. Owing to an absence of specific antiviral treatments and anxiety of clinical handling, thousands of grave cases have died every day worldwide.[6]

The association between COVID-19 and environmental factors such as atmospheric parameters and air quality, reflecting the most inclusive study to date on the role of climatological parameters and air quality factors in COVID-19. High carbon monoxide levels is a jeopardy factor, whilst upper temperatures, augmented air pressure and well ventilation may decrease the transmissibility of the novel Coronavirus.[7] Negative relations between temperature/humidity and COVID-19 transmission was recognized.[8] Cold and dry circumstances were potentiating influences on the feast of the virus, though warm and wet climates seem to lessen the spread of COVID-19.[9]

Recent research have revealed that the transmission way of COVID-19 is bat-human, with intermediate host yet to be recognized; it was transmitted mostly by respiratory droplets, as well as human-human transmission. Weather circumstances are categorized as top forecasters of corona virus ailments as wind speed, humidity, temperature and wind speed are important in the transmission of infectious diseases. Humidity and temperature will show a significant role in mortality rate from COVID-19 as weather indicators and temperature associate with the feast of COVID-19.[10]

Vitamin D is a steroid hormone that shows a principal role in regulation of innate immunity. The mainstream of tissues expresses the vitamin D receptor, letting a response to the hormone. people acquired vitamin D precursors from exposure to sunlight and to a much lesser amount from food. Respiratory epithelial cells constitutively stimulate vitamin D and are proficient of making a microenvironment that has high levels of dynamic form of the vitamin. Stimulation has downstream effects that comprise up-regulation of the cathelicidin antimicrobial peptide gene and the TLR, co-receptor, CD14. Viral contagion leads to elevated stimulation of vitamin D and extra rises in cathelicidin mRNA. Cathelicidin is documented to be an important integral of innate immunity in the lungs and thus limited vitamin D activation might be an important portion of host immunity.[11]

Sunshine vitamin levels rise in summer and reduce in cold seasons because of dependence of vitamin D on sunlight. Research have also revealed that this seasonal difference might rely on latitude, then it has been found that vitamin D creation is well on latitudes close to the equator. Skin color has a strong influence on vitamin D status, since it reduces the UVB radiation that efficiently reaches the skin, fatness is a jeopardy factor. It has been suggested that this is because of fatty tissue uptake of vitamin D, decreasing its bioavailability. Concerning age, it has been suggested that vitamin D insufficiency in the aged people can be attributed to a reduction in the skin capacity to produce sunshine vitamin because of ageing, from a lack of exposure to daylight, or from a lacking nutritional intake.[12]

The seasonal variations in the action of both the sympathetic nervous system and the rennin-angiotensin system have been connected to weather factors. While a cold weather is related with augmented plasma norepinephrine levels, warm ambient temperature might activate the rennin-angiotensin axis. Exogenous seasonal influences for instance wind, atmospheric pressure, and length of daylight may affect endogenous rhythms, changing the shape and timing of seasonal difference.[13] The levels of angiotensin 2 did not display seasonal variations.[14] Clear seasonal rhythm alterations in blood pressure of aged patients with critical hypertension, and the seasonal variation of blood pressure is connected with raised plasma Angiotensin 2.[15]

Prolonged exposures to cold air seem to quicken the consumption of thyroid hormones that initially establishes as low concentrations of free T3 and free T4.[16] Low serum triiodothyronine and thyroxine concentrations, frequently detected in patients with SARS, have also been documented and decreased TSH level.[17] An important connotation of thyroid disease with severe COVID-19 stated.[18] High frequency of vitamin D deficiency and insufficiency in adults and teenage populace from one of polar areas, North-West region of Russia, and an association of low serum 25(OH) D level with female gender, obesity.[19]

## Conclusion

Polar zones countries are of great risk of COVID.19 spread and people in these countries particularly elderly may develop serious complications even death. Short duration of sunshine, cold temperature, low humidity and air pollution favor feast of SARS cov-2 among population inhabit these region of the world. These climatic factors affect vital biological elements such as vitamin D, angiotensin 2 and thyroid hormones, and then result in bad prognosis of the disease.

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## Conflicts of interest

The authors declare there are no conflicts of interest related to the article.

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