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Investigating the effect of ambient temperature and indoor temperature (roof) on Covid 19 transfer: An evidence-based review report

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Abstract

Background and Aim: Corona disease, like other viral diseases, is affected by various factors. The effect of weather conditions on the pattern of this disease has always been discussed, our aim in this study is to get acquainted with the effect of indoor temperature and ambient temperature on the transmission of Covid 19.
Methods: In this review study, by searching for articles from 2019 in Science Direct, Scopus, Pubmed and some library sources, the necessary information and scientific data about corona disease and the effect of temperature on it were collected.
Results: Various studies have investigated the effect of temperature and weather conditions on the prevalence of coronavirus. Studies have been conducted in different countries, and some studies, in addition to the relationship between ambient temperature and the prevalence of Covid 19 disease, have also examined its relationship with the mortality rate caused by this disease. In most studies, a negative relationship was reported between ambient temperature and the prevalence of Covid-19 disease.
Discussion and Conclusion: Most studies have reported that the prevalence of this disease decreases with increasing ambient temperature. Also, most studies have examined the relationship between temperature and the disease along with the relationship between air humidity and the disease, the results of which often reported a negative relationship between air humidity and the transmission of Covid disease. However, it is recommended that studies be performed in areas with high temperatures.

Keywords: Corona Virus, Covid 19, Corona and environment temperature, Covid 19 and heat.

Introduction

Covid 19 is a pandemic that has affected almost all countries, starting in 2019 in Wuhan, China (1). Coronary heart disease has spread around the world and can not only be considered as a health problem but also affects the global economy and the environment in various ways (2). With the increasing prevalence of the disease, the number of patients and deaths due to this disease is increasing every day (3). Due to the fact that Covid 19 disease is a respiratory disease, the causative virus is present in the infected person's respiratory system and in all surfaces and mucous membranes of the patient (4). Therefore, there are different ways for the virus to leave the patient's body and contaminate the environment, the most important of which are sneezing, coughing and even talking (5).The number of contaminated particles that leave the body of the carrier through these pathways, depending on the type andTransfer conditions vary from 10 to hundreds of thousands of particles (6). Depending on the particle size, different behaviors can be expected from them in air (6). Climate change is considered as an effective factor in the emergence and recurrence of many infectious diseases (7). This is due to the fact that pathogens and their related vectors need an ideal environment for growth, survival, transmission and reproduction (8).Many known environmental factors such as temperature, humidity, UV, wind
and rain are important in the transmission of infectious diseases (9). Each of these climatic factors has different effects on the epidemiology of different infectious diseases (9). Coronary heart disease is also affected by climatic factors as a viral disease. The aim of this study was to review the available evidence on the association of temperature with Covid virus 19.

Materials and Methods

In this review study, by searching for articles from 2019 in Science Direct, Scopus, PubMed and some library sources, the necessary scientific information and data about Corona disease, Corona virus, environmental conditions of this virus and the effect of temperature on the virus Has been collected and reviewed and concluded in this review study. Single and combined keywords such as Corona Virus, Covid 19 and Corona and environment temperature, Covid 19 and heat were used to search for articles.

Results

The role of ambient temperature on the survival of respiratory viruses

The temperature range for the survival of viruses is defined as a narrow range, although many viruses are not technically viable, but are able to survive biologically over a wide range of ambient temperatures (10). Advanced viruses such as rhinoviruses and coronaviruses are often active in cold and dry conditions and therefore the prevalence of respiratory infections such as SARS COV-2 increases in these conditions (11). The susceptibility of these viruses to heat is used as a virus inactivating agent in vaccines (12), and temperatures of 55 to 65 ° C for 15 to 30 minutes are used as inactivating conditions for many advanced viruses, including Coronaviruses are considered (13).The body's first line of defense against respiratory viruses is the nasal mucosa and sinuses. In winter, when sunlight is limited and the air is cold and dry, the nasal mucosa becomes the coldest part of the body, and if the airways are dry, Thickened mucus hardens these pathways and acts as a breeding ground for viral agents (14).

Indoor air connection and Covid-19

In addition to some outdoor pollutants, indoor air contains a wide range of pollutants, including VOCs from furniture and household products (15). The extent of exposure to indoor air pollution from domestic energy consumption depends on factors such as the type of fuel, housing characteristics, and how the stove is used (16). In developing countries, smoke from the use of biomass (wood) for heating and cooking is a major source of indoor air pollution and contributes to respiratory infections (17). Smoke exposure from biomass burning has been reported

to be an effective factor in increasing the incidence of chronic pulmonary obstruction (COPD) (18). However, a large population-based study recently conducted in low-, middle-, and high-income countries reported that the use of solid fuels for cooking or heating was not associated with chronic obstructive pulmonary disease (19). Because Covid-19 is a respiratory disease, burning biomass may also affect COVID-19. As Covid-19's disease reduction strategies have changed the way people work and dramatically increase the time spent indoors, more research is needed on the quality of home and workplace air and its impact on health.

Climate factors and Covid-19

Like other infectious diseases, transmission of coronary heart disease is affected by the climatic system (20). The main parameters of climate in this field include temperature, humidity, rainfall and wind speed (21). Several studies have reported a significant association between Covid 19 and climatic factors.

Bashir et al reported that air quality significantly increased the prevalence of Covid 19 infection in New York City (22). In addition, Zhu et al. In a study examined the effect of climatic factors on the transfer of Covid 19 in China and reported that the particles pm2.5, pm10, co2 and o3 all had a positive correlation with the transfer of Covid 19, but between so2 Environment and Covid-19 transfer were negatively correlated (23). Although several studies have emphasized the impact of climate indicators and the transmission of Covid 19, some studies have examined the effect of climatic factors on the mortality rate of Covid 19. Ma et al. Examined the effect of meteorological factors on mortality due to Covid 19 and reported that there was a significant positive correlation between daily air temperature and corona mortality while a correlation was found between air humidity and mortality. It was negative for this disease (24). Ogen examined the effect of No2 on Covid 19 mortality in Italy, Spain, France, and Germany and reported that long-term exposure to No2 increased corona mortality (25). However, Sobral et al. Did not report any association between air temperature and corona mortality (26).

Air temperature and Covid -19

Many countries are challenged to control the rate of transmission of Covid-19 transmission. There is much debate about the effect of temperature on Covid-19 transmission. It is said that hot and humid climates in India may be the cause of transmission. Relatively low Covid disease 19 (27). However, the implementation of a strict quarantine program has played an essential role in reducing the incidence of Covid 19 (27). There is a lot of discussion about the negative effect of temperature on the transmission of coronary heart disease, researchers have studied both the positive and negative effects of temperature on this disease. Chin et al. reported that the virus has the longest survival at 4 ° C, however it is very sensitive to heat (28). Xie et al. reported that when ambient temperature is below 3 ° C, ambient temperature has a positive linear relationship with Covid-19 disease (29).A global study of 166 countries minus China found a negative correlation between temperature and coronary heart disease, with each degree Celsius increase in temperature associated with a 3.08% decrease in incidence (30). In another study, the authors reported a significant negative correlation between mean ambient temperature and daily temperature range with corona outbreaks in various Chinese cities. The number of cases is reduced by 80 to 90% daily (31). Another study, based on temporal analysis in different parts of China, found that in the Hubei region, the number of daily cases decreased by 36 to 57 percent for every degree Celsius increase (32). A study in Africa reported that each degree Celsius increase in daily temperature reduced the number of cases by about 13% (33).In a study of eight South American states and cities, the authors reported that the mean daily temperature had a strong negative correlation with daily Covid-19 infection, the strength of which varied from region to region, and the strongest correlation. It was reported in Santiago, while there was no significant association in Val Paraiso and Lambico (34). In a study, Prata and colleagues

reported that there was a negative linear relationship between temperature and Covid-19 incidence in major Brazilian cities, with a 4.9% reduction in Covid-19 incidence for each degree of temperature increase (35).Chan et al. Reported that coronaviruses survive for about 5 days at 22 to 25 ° C and 40 to 50% humidity (36). A recent study showed that the corona virus may survive on surfaces such as glass, stainless steel and scans for up to 28 days, provided the temperature does not exceed 20 ° C and if the ambient temperature rises to 20 ° C. Increases by 24 hours (37). The seasonal pattern of Covid 19 is somewhat similar to the flu, with a higher prevalence in winter than in other seasons (38).

Discussion and Conclusion

The present study included studies on the effect of ambient temperature and its relationship with the prevalence of coronary heart disease. In general, most studies have examined the relationship between temperature and humidity factors and coronary heart disease more than other meteorological factors. In general, most studies have reported a negative relationship between ambient temperature and the number of cases. The reason for the difference in the incidence rate with increasing temperature in different studies may be the difference in sample size. Less testing is performed in that time period (39), in general, the resistance of Covid virus 19 and other similar viruses' increases in low temperature and low relative humidity conditions.From a practical point of view, it is important to note that the use of heat can be considered as a cheap and affordable method of preventing coronary heart disease.

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