

THE EFFECT OF AIR QUALITY PARAMETERS IN SPREADING COVID-19

Submitted in partial fulfillment of the requirements for the award of

Master of Science in Chemistry

by

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**DEPARTMENT OF CHEMISTRY
SCHOOL OF SCIENCE & HUMANITIES**

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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of D.Lavanya (39910010) who carried out the project entitled **"THE EFFECT OF AIR QUALITY PARAMETER IN SPREADING COVID-19"** under my supervision from December 2020 to April 2021.

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DECLARATION

I **D.LAVANYA** hereby declare that the Project Report entitled “**THE EFFECT OF AIR QUALITY PARAMETER IN SPREADING COVID -19**” done by me under the guidance of **Dr. K.CHENNAKESAVULU Ph.D.**, Associate Professor Department of Chemistry, Sathyabama Institute of Science and Technology, submitted in partial fulfilment of the requirements for the award of Master of Science degree in Chemistry.

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I am ever grateful to the almighty for the blessings upon me to do this work in a successful way.

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D.Lavanya

ABSTRACT

The current work describes about the spreading of Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-Co V-2) in areas around Chennai which is studied based on Particulate matter (PM -2.5), Particulate matter (10), Benzene , toluene, cpcb parameters, In order to conclude the above issue certain data's regarding number of positive cases which have been confirmed since march 19 , 2020 – march 20 , 2021.hence the current theoretical studies says that the outbreak also pays a way for the spreading of covid-19.this work elaborate the relationship between the air quality parameters and covid-19.

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LIST OF ABBREVIATION

SARS-COV-2	Severe Acute Respiratory Syndrome Coronavirus-
PD	Population Density
GHSI	Global Health Security Index
HDI	Human Development Index
PM _{2.5}	Particulate matter 2.5
PM ₁₀	Particulate matter 10

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CHAPTER 1

INTRODUCTION

Since the beginning of the coronavirus disease 2019 (COVID-19) pandemic, millions of human cases have been reported globally. Several previous studies have found a link between climate and the spread of certain germs and viruses that cause diseases, particularly malaria, which only spreads under certain weather conditions in terms of temperature and humidity. There is no doubt that there is a plethora of diseases, the spread of which is linked to specific seasons. There is a connection between air humidity and bacterial and viral survival. Since the influenza virus dies more rapidly in high humidity and fast-moving air, the winter months, when humidity drops and air movement slows, are best for the spread of respiratory infections. Humans, livestock, and birds all suffer from the epidemic disease, which spreads through society invisibly and has a negative effect on their socioeconomic status. The infection rate, recovery, and mortality values for SARS-CoV-2 in a specific area or country indicate constructive approaches, preparedness, and the use of advanced technologies in social knowledge to avoid the spread of the coronavirus.

The outbreak of a new virus, SARS-CoV-2, is currently affecting 204 countries around the world. SARS-CoV-2 pandemic spread from Southern China province to the rest of the country, wreaking havoc on public health, the economy, and the environment (1) (McKee and Stuckler, 2020; Mahabee et al., 2020). Australia, Cambodia, Canada, France, Germany, Japan, Nepal, Singapore, South Korea, Taiwan, Thailand, United Arab Emirates, United States, and Vietnam have all reported travel-related incidents.

Outside of China, Vietnam was the first country to detect human-to-human transmission. As of March 30th, 2020, The United States of America, Italy, and China had the most incidents. When opposed to viruses, bacteria are normally temperature tolerant. Since coronavirus has protein binders, it does not function well in hotter and more humid conditions. At a temperature of 20-26 °C and a relative humidity of about 45 percent, the virus could survive for up to three days. If the surface temperature is higher than 3 °C, it is inactive. In Brazil, the number of

SARS-CoV-2 cases is increasing linearly.

Below 25.8 oC, and over 25.8 oC, it's smooth (2) (Aaron et al., 2014; Lisa et al., 2010; Chan et al., 2011; David et al., 2020). Temperatures and humidity have differed significantly between countries that have been struck hardest by the COVID-19 pandemic and those that have avoided a comparable scale of outbreak. Temperature and humidity levels that appear to correlate with lower observed occurrence rates are located geographically between 30 N and 30 S, which are circles of latitude 30 degrees north and south of the Earth's equatorial axis, respectively. Even though they account for more than 40% of the global population, the absence of significant numbers of cases in the countries between 30 S and 30 N (5,000,000, or approximately 15% of total COVID-19 cases as of 1 May 2020) is perplexing. Many of these countries are said to be lagging behind, with an exponential rise in the number of COVID-19 cases 2 to 3 weeks behind North America and Europe. The low number of confirmed COVID-19 cases is due to a lack of documentation and testing in several of these countries, including Pakistan, Indonesia, and many African nations, which have underdeveloped health infrastructure.

However, several countries and regions, including Singapore, the United Arab Emirates, Saudi Arabia, Australia, and Qatar, have conducted more COVID-19 tests per million citizens than the United States, Italy, and many European countries, meaning that non-testing is not a problem, at least in the 30 S and 30 N latitudes. Despite the fact that India conducted hundreds of thousands of tests recently, the estimated number of cases per million people did not significantly increase. Even though most of them have not adopted drastic quarantine measures like those in China and Europe, the incidence rate of COVID-19 cases in all of these countries is lower than in America and Europe. Many of these countries, such as the United Arab Emirates (which receives more than 15 million visitors annually), Singapore (which receives more than 18 million visitors annually), and Qatar (which receives around 2 million visitors annually), are also global travel hubs, with thousands of people entering and leaving the country each day. Hundreds of thousands of pilgrims from all over the world visited Saudi Arabia on a daily basis until February 27, 2020. Given these facts, it's worth looking into the other factors that influence COVID-19's occurrence and spread. The epicenter

of COVID-19 is big, well-connected cities in each country and state, and the role of connectivity and population in the spread of a pandemic is well known. SARS-CoV-2 is a coronavirus that causes illnesses ranging from common cold-like symptoms to severe acute respiratory syndrome (SARS).

According to the Baltimore classification, it belongs to the Betacoronavirus genera in the family Coronaviridae of the order Nidovirales and is classified in Group IV. This group is distinguished by the presence of positive single-stranded RNA. As an enveloped virus, the virion, or the form the virus takes when outside the body, is wrapped in a fatty layer to protect it during transmission. If the envelope is damaged or dried out, the virus will die. Since this layer is sensitive to heat, detergents, solvents, and oxidants, the virus is relatively delicate to the external environment. This weakness has been used to control it (Swilling 2015). The virus can survive for 3 hours in aerosols, 4 hours on copper, 24 hours on porous surfaces like cardboard, 48 hours on stainless steel, and 72 hours on plastic (Van Doremalen et al. 2020). Aerosols and fomites have been identified as potential modes of SARS-CoV-2 transmission. The SARS-CoV-2 virus's survival time is determined by the environment. Existing evidence suggests that airborne transmission, particularly via nascent aerosols from human atomization, is very rapid and a dominant mode of transmission for this disease, as it was for SARS-CoV-1 (Zhang et al. 2020). When determining which mitigation strategies work best, “super spreaders”—single individuals who infect a large number of people in a short period of time—must be considered. Heterogeneity in transmission risk is a well-known phenomenon.

Super spreaders have had a significant impact on the spread of infectious diseases. The dynamics of recent coronavirus transmission SARS is an abbreviation for Severe as well as MERS. In this case, Lloyd-Smith et al.[] concluded in 2005 that ‘superspreading events’ are important in many infectious disease epidemics have occurred, with approximately 20% of the population infected. The population is responsible for approximately 80% of transmission events. This large-scale heterogeneous transmission pattern cannot be explained by independent overflowing events due to individual variations. It may not be possible to occur by random super spreaders and may depend on other super

spreaders. The proposal is that infections caused by super spreaders lead to new super spreaders rather than those caused by a less infectious person transmitting. Exposure to differentiated viral loads is the means by which this would be possible.

SARS-CoV-2 appears to be the primary mode of transmission through exposure to respiratory gout and direct contact with infected people and their polluted environment. (Xiao et al., 2017, van Dormagen et al., 2020) SARS-CoV-2 has a physical size of approximately 70–130 nm and spreads primarily through the emission of macro droplets of 50–100 m, such as coughing and sneezing. Macro droplets are made up of the virus in the centre, which is surrounded by water molecules as well as mucus or cellular debris. Because these macro droplets are heavy and fall quickly to the ground, health officials have established a safety distance of 2 m to limit viral transmission. Macro droplets can also be deposited on solid surfaces, where viral RNA can be measured several hours later. Droplets can contain a few or a million viral particles, and the differential load determines how contaminated the environment is and how much infective dose a susceptible person is exposed to.

Due to high viral shedding, a case with a high intensity of infection has the potential to be a super spreader. Susceptible people who are exposed to this hypothetical super spreader will receive a high viral dose. Infections caused by high viral loads are expected to be severe, as a large number of viral particles initiating replication in synchrony may overwhelm resistance mechanisms, and poor viral replication control may result in a new potential super spreader. . Although highly contagious, the SARS-CoV-2 virus is an enveloped virus that is relatively fragile due to its protective fatty layer's sensitivity to heat, ultraviolet radiation, and certain chemicals. However, heat and liquid treatments can damage some materials, and ultraviolet light is inefficient in shaded areas, so other disinfection alternatives are required to allow safe re-use of materials and spaces. Experiments have shown that exposure to air pollution reduces immune response, allowing viruses to penetrate and replicate.

Viruses can survive in air due to complex interactions with particles and gases that are affected by: 1) chemical composition; 2) particle electric charges; and 3) meteorological conditions such as relative humidity, ultraviolet (UV)

radiation, and temperature. Furthermore, by reducing UV radiation, air pollutants may promote viral persistence in the air and decrease vitamin D synthesis. Nitrogen oxides (NO_x) and ozone are two of the gaseous pollutants that have been studied at the population level in relation to COVID-19 and other respiratory viruses (O₃).

NO₂ is a major air pollutant in urban areas, primarily caused by traffic, particularly diesel vehicles, and has been linked to asthma, COPD, bronchiolitis, and cardiovascular disease. Tropospheric O₃ levels are affected by other pollutants, such as NO_x and VOCs, as well as climate parameters, and have been linked to increased cardiorespiratory mortality and morbidity. Thomas Bourdrel, Isabella Annesi-Maesano et al.,2020.

The first and most significant factor is linked to the climate and eating habits, which can provide some level of infection resistance. There is a wealth of literature in Ayurveda and other Indian systems of medicine on the definitive beneficial effects of Indian spices in boosting immunity. Turmeric, for example, is the most popular food ingredient in Indian kitchens because it contains curcumin (an active compound polyphenol). Curcumin is an antioxidant with anti-inflammatory, antibacterial, and wound-healing properties. Several studies have suggested that it could be used to treat arthritis, cancer, cardiovascular disease, and inflammatory bowel disease.

The Indian subcontinent's vast geographical diversity, ranging from the Himalayan mountains to beaches and deserts, as well as the varied climatic conditions and lifestyle habitats found throughout India's numerous regions and states, contribute to the extraordinary diversity of its people. We believe that these epigenetic, environmental, and lifestyle influences can have an effect on COVID-19 immunity, which is still largely unknown. Narinder K. Mehra & Gaurav Sharma 2020

CHAPTER-2

LITERATURE SURVEY

1. Aerosol and surface stability of HCoV-19 (SARS-CoV-2) compared to SARS-CoV-1

van Doremalen et al., 2020.

The SARS-CoV-2 pathogen is stable in aerosols for up to 3 h and on copper, cardboard, plastic, or stainless-steel surfaces for up to 4 h, 24 h, and 2–3 days, respectively

2. COVID-induced economic uncertainty

Baker et al. (2020)

Many of the recent studies cited here have indicated a link between weather and the COVID-19 pandemic, similar to other viral infections including influenza. However, several other studies have found conflicting findings, indicating that weather conditions may not be linked to the COVID-19 used a negative relationship between humidity and transmission

3. If the world fails to protect the economy, COVID-19 will damage health not just now but also in the future

McKee and Stuckler, 2020; Mahabee et al., 2020.

The present work describes the spread of SRS2 Coronavirus-2 (SARS-CoV-2) to tropical and temperate areas. The effect of insolation and PM_{2.5} is confirmation that dumbbell and solid/liquid interface formation mechanism explain the propagation of SRS-CoV 2. The present meta-analysis focuses also on the effect on the diffusion of SARS-CoV-2 cases by GHSI, HDI, PD and PM_{2.5}.

4. Will Coronavirus Pandemic Diminish by Summer? SSRN

Bukhari and Jameel, 2020; Marcos et al., 2020. On March 11, 2020,

WHO, UN announced a worldwide pandemic. Bukhari and Jameel recently reported 90% of the spread of SARS-CoV-2 at 3 °C–17 °C temperatures and total

humidity of 4-10 gm/m³. The absolute moisture >10 gm/m³ is found in most Asian countries. The higher precipitation also increases SARS-CoV-2 transmission.

5.Cesar and Fabian, 2019; Zhao et al., 2012; Hongchao et al., 2020; Muhammad et al., 2020)

Respiratory activity depends largely on the geometric countries, as well as environmental factors like temperature, humidity, precipitation, air quality, PM_{2.5} and availability of cold oxygen. The main study examines the adverse effect on tropical and temperate zones by SARS-CoV-2.

6. Summertime Temperature Variability Increases With Local Warming in Midlatitude Regions .Aaron and Michael, 2013; Lisa et al., 2010; Chan et al., 2011; David et al., 2020.

When compared with viruses, bacteria are temperature resistant. In hotter and humidified spots coronavirus does not survive very well because it has protein binding agents. Such a virus persisted more than 3 days at 20-26°C with an approximately 45% relative humidity. If more at 25°C than 3°C, its surface is inactive. In Brazil, SARS-CoV-2 cases are increased at less than 25.8°C and flat at more than 25.8°C

7. A spatio-temporal analysis for exploring the effect of temperature on COVID-19 early evolution in Spain

Alvaro Briz-Redon , Angel Serrano-Aroca et al.,2020

It can be desirable to analyse sensitivity, which rejects geographical units of extreme values, such as those where the virus started early and spread faster, because these particular units can exercise an excessive impact. It therefore appears as if the summer can reduce COVID-19 modestly, but this will not be large enough to control the epidemic

8. Impact of ambient fine particulate matter (PM_{2.5}) exposure on the risk of influenza-like-illness: a time-series analysis in Beijing, China

Cindy Feng, Jian Li et al.,2016;

Studies have shown exposure to PM_{2.5} is associated with a number of

adverse health outcomes ranging from respiratory disease to cardiovascular disease .Elevated fine-particulate concentrations are also the cause of.This is also one of the important reasons for WHO designating all countries to have standards for PM2.5.

9. Do superspreaders generate new superspreaders? A hypothesis to explain the propagation pattern of COVID-19

PM Beldomenico - International Journal of Infectious Diseases, 2020 -Elsevier

The current global propagation of COVID-19 is heterogeneous, with slow transmission continuing in many countries and exponential propagation in others, where the time that it took for the explosive spread to begin varied greatly.

10. The effect of latitude and PM2. 5 on spreading of SARS-CoV-2 in tropical and temperate zone countries

K Chennakesavulu, GR Reddy - Environmental Pollution, 2020

The epidemic disease's spread through stealth mechanism in society and depressing the 35 socio economical status of humans, animals and birds. The SARS-CoV-2 infection rate, recovery 36 and mortality values in particular region or country recommends the proactive approaches, 37 preparedness, usage of advanced technology in social awareness against spreading of 38 coronavirus.

11. Effects of temperature and humidity on the spread of COVID-19

Mecenas P, Bastos RTdRM, Vallinoto ACR, Normando D (2020)

Considering the existing scientific evidence, warm and wet climates seem to reduce the spread of COVID-19. However, these variables alone could not explain most of the variability in disease transmission. Therefore, the countries most affected by the disease should focus on health policies, even with climates less favorable to the virus.

12. Indian population could have intrinsic immunity to resist COVID-19 challenge

Narinder K. Mehra & Gaurav Sharma 2020.

The Indian subcontinent's vast geographical diversity, ranging from the Himalayan mountains to beaches and deserts, as well as the varied climatic conditions and lifestyle habitats found throughout India's numerous regions and states, contribute to the extraordinary diversity of its people. We believe that these epigenetic, environmental, and lifestyle influences can have an effect on COVID-19 immunity, which is still largely unknown.

CHAPTER 3

AIM AND SCOPE

Aim of the Current Work

Current work involves correlation of research and analysis of certain air parameters. Since march 9, 2020, until march 27, 2021

- 1.To obtain clinical records of covid-19 patients.
- 2.To investigate how the corona virus spreads in response to changes in air quality.
- 3.To investigate the following in and around Chennai's arears.

Scope of the Project

1. The purpose of this study is to compare the relationship between air quality parameters and the spread of the corona virus covid-19 using monthly data from the Central Control Room for Air Quality Management - All India.
2. By analyzing the monthly reports of cpcb parameters, we can conclude that the spread of covid-19 coronavirus is primarily determined by air quality.

CHAPTER-4

MATERIALS AND METHODS

4.1.SCOPE OF STUDY AREA

The current study is predicting the spread of SARS-CoV-2 in Chennai and the surrounding areas. The study looks at the air quality in Alandur and the surrounding areas, as well as the total number of positive cases in Chennai.

4.2.DATA COLLECTION

The daily registered coronavirus cases are taken from the Tamil Nadu government's official website between March 19,2020 to March 20,2021, and the corresponding air parameters data were collected from the air quality index data-all India between the same dates.

The Tamil Nadu Health Department has launched a web portal - <http://stopcoronatn.in> - to serve as a one-stop shop for all coronavirus disease-related inquiries (COVID-19). People with a travel history and symptoms of COVID-19 can now self-report on the portal, and the 24x7 control room will contact them.[1]

The portal will feature guidelines issued by the Government of India and the World Health Organization, advisories from the State government, messages from the Chief Minister's office, and daily bulletins. It will be developed by the National Health Mission-Tamil Nadu and operated by the Directorate of Public Health (DPH) and Preventive Medicine.

The AQI is a daily air quality reporting index. It tells you how clean or unhealthy your air is and what health implications might be. AQI focuses on health effects that can occur within hours or days. Unhealthy air after respiration. Four of the AQI are calculated. Major Clean Air Act pollutants: soil ozone, particulate pollution, CO₂ and Sulphur, respectively

In order to provide the public with simple access to national information about air quality, local partners have developed an AIR Now website. AQI is available daily at www.airnow.gov.

CHAPTER-5

RESULTS AND DISCUSSION

5.1 Statistical analysis on transmission of SARS-CoV-2

The coronavirus case was followed from March 19th, 2020 to March 27th, 2021. This graph has been plotted with the total number of positive cases for the aforementioned period across Chennai, and it is clear from the graph that the total number of covid-19 positive cases has been rapidly increasing. According to the Tamilnadu stop corona report, a total of 256359 positive cases and 4280 deaths were confirmed on April 7, 2021.

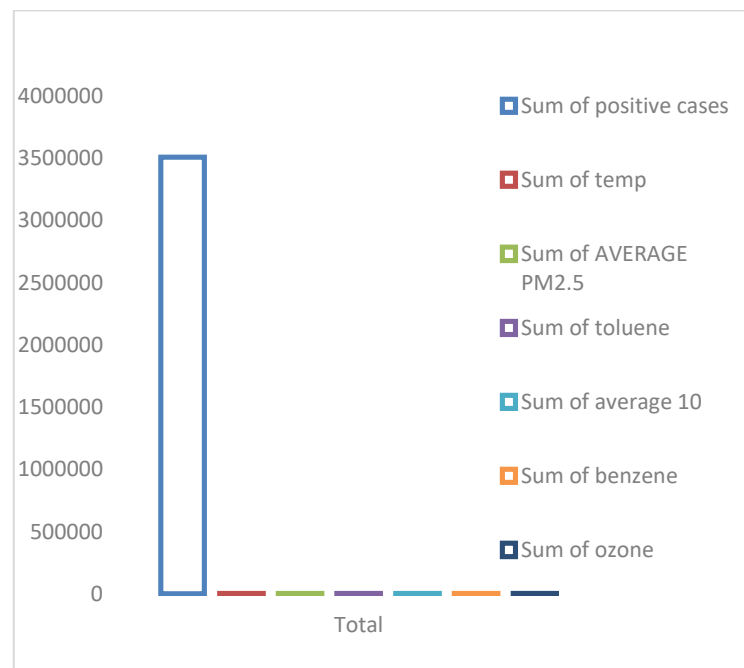


Fig. 5.1. Statistical analysis of SARS-CoV-2

5.2 The Effect of Particulate Matters in Air

The disparity in PM2.5 effects during flu season versus non-flu season advances our knowledge of the biological mechanisms of influenza transmission. During the flu season, our results showed that increased PM2.5 increased the risk of ILI, while the impact of PM2.5 was not important during the non-flu season. We believe that during flu season, the viral load was sufficiently high, and that the hosts were more vulnerable due to body cooling and/or respiratory tract drying. In comparison, even though PM2.5 levels were elevated during the non-flu season, the hosts were less susceptible to virus infection, possibly due to the warmer

temperature and higher humidity, which causes the hosts to be more immune to virus infection, resulting in a lower total viral load suspended in the air. As a result, both the amount of viral load and the pollutant that the viral agent emits may play critical roles at the same time. According to our findings, PM_{2.5}, a particular component of a mixture of air contaminants, is significantly linked to ILI. However, different pollution sources can be correlated with different outcomes in a variety of ways and at different times, and no particular pollution source can be blamed for a specific outcome. [2]

After controlling for the impact of other contaminants such as carbon monoxide (CO), sulphur dioxide (SO₂), nitrogen dioxide (NO₂), or ozone, a number of studies showed that the PM effect remained robust (O₃). PM varies in size and composition as well. Indeed, depending on their diameter, these particles are classified into many categories. PM₁₀ refers to particles with a diameter of less than 10 m. PM₁₀ is further classified into “coarse particles” (diameter 2.5–10 m), “fine particles” (diameter 2.5 m), and “ultrafine particles” (diameter 0.1 m). Several elements (Si, Al, Ca, Fe, Ti), transition metals (V, Cr, Ni, Cu, Zn), Pb, inorganic ions (SO₄²⁻, NO₃⁻, Na⁺, NH₄⁺, K⁺), and volatile organic compounds make up its composition. Moreover, the composition and concentration of particles is extremely changeable and depends on numerous factors such as climate variation, sources of emissions and geographical location. Its composition can intriguingly change every day and even on the same.

Air Quality Index (AQI) Values	Levels of Health Concern	Colors
0-50	Good	Green
51-100	Moderate	Yellow
101-150	Unhealthy For Sensitive Group	Orange
151-200	Unhealthy	Red
201-300	Very Unhealthy	Purple
301-500	Hazardous	Maroon

Table 5.1: Air Quality Index

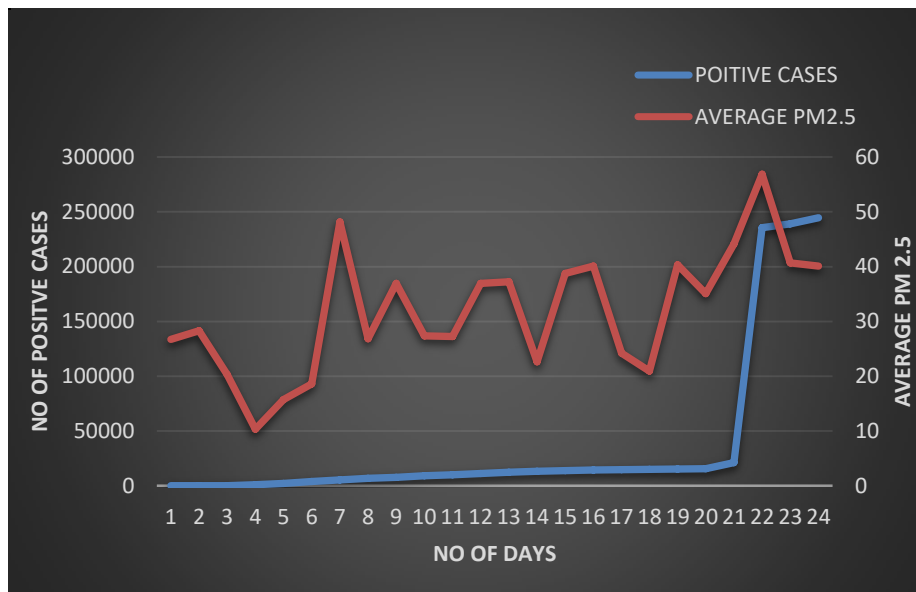


Fig 5.2 The Effect Of $PM_{2.5}$ on Spreading Covid-19

People with heart or lung problems, as well as older adults, are more likely to visit emergency rooms, be admitted to hospitals, and, in some cases, even die when exposed to particle emissions. People with heart disease can experience chest pain, palpitations, shortness of breath, and fatigue as a result of particle pollution exposure. Heart arrhythmias and heart attacks have also been linked to particle emissions. People with lung disease may not be able to breathe as deeply or intensely as they usually would when exposed to high levels of particle pollution. Coughing and shortness of breath are some of the symptoms they can experience. Healthy individuals can also experience these side effects, but they are less likely to have more severe consequences. Particle contamination can also make people more susceptible to respiratory infections and make chronic ones worse.[1]

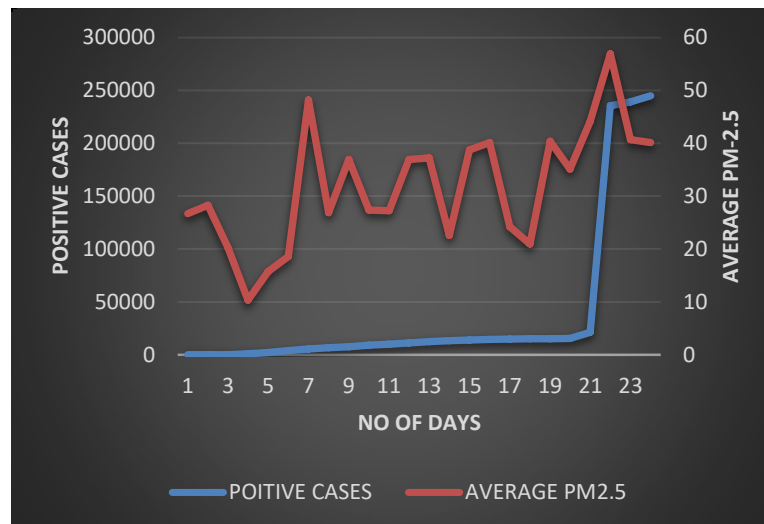


Fig 5.3 The Effect Of PM_{10} In Spreading Covid-19

5.3 The Effect of Ozone in spreading of coronavirus-19

Ozone sensitivity affects many groups of people, particularly those who spend time outside. Since ozone levels are higher outside, and physical exercise induces quicker and deeper breathing, which draws more ozone into the body, this is the case. People with lung diseases like asthma, chronic bronchitis, emphysema, and respiratory disease are particularly vulnerable to ozone. At lower stages, they will typically suffer from more severe health consequences. Ozone can worsen their illnesses, resulting in more drug usage, doctor and emergency department visits, and hospital admissions. In general, as ground-level ozone concentrations rise, more people tend to suffer from more severe health effects. Ozone has a variety of effects on the lungs and respiratory system. It may be able to:

- Inflammation of the respiratory system
- Lung function is reduced.
- Increase the susceptibility of the lungs to infection
- Asthma flare-ups
- Such chronic lung conditions will be aggravated.
- Lung injury that is irreversible
- All should be worried about ozone exposure when levels are extremely high.

Concerning ozone-related risks, it has been shown that as an environmental pollutant, it reduces maximal transpulmonary pressure, increases respiratory rate, and decreases tidal volume, as well as significantly increases mean airway resistance and specific airway resistance, potentially contributing to an increase in influenza disease.

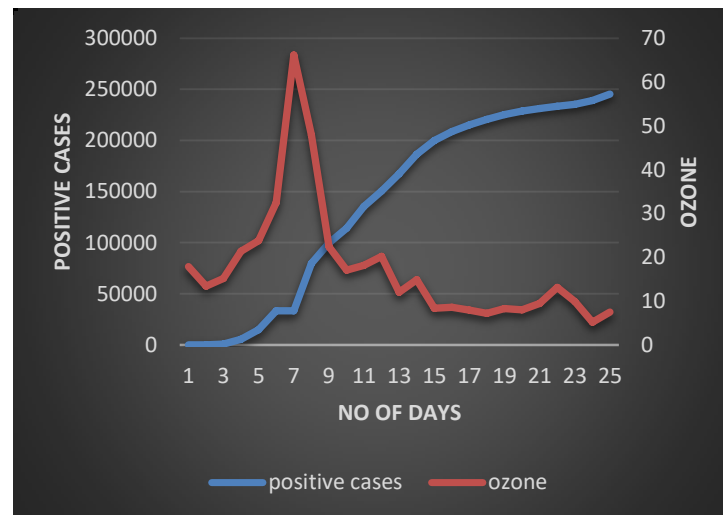


Fig 5.4 The Effect of Ozone on Spreading Covid-19

5.4 The Effect of Temperature on transmission of SARS-CoV-2

Although several studies found that temperature was negatively associated with COVID-19 mortality and transmission, another study found no evidence of an association. According to recent research, dry (relative humidity 20%) and cold air have an impact on both immunity and viral spread because dry air may facilitate airborne viral transport and cold conditions, in addition to low humidity, may impair the functioning of airway ciliated cells. Ambient air pollution concentrations are also affected by relative humidity and temperature

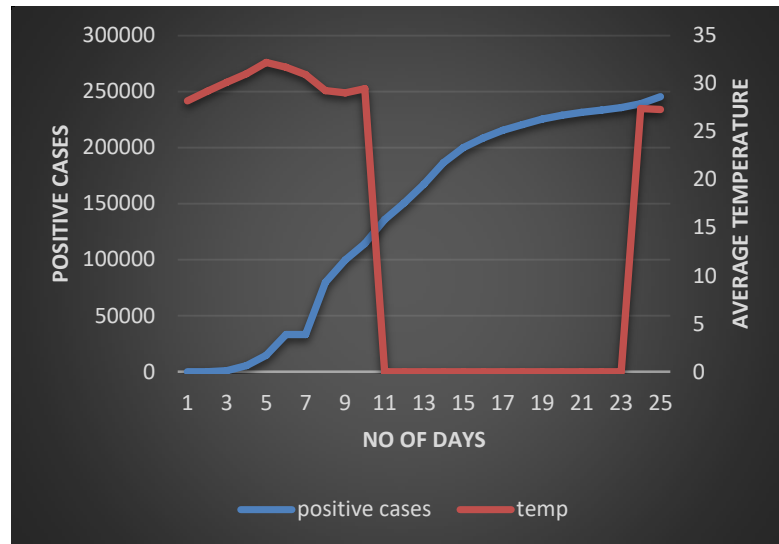


Fig 5.5 The Effect of Temperature on Spreading Covid-19

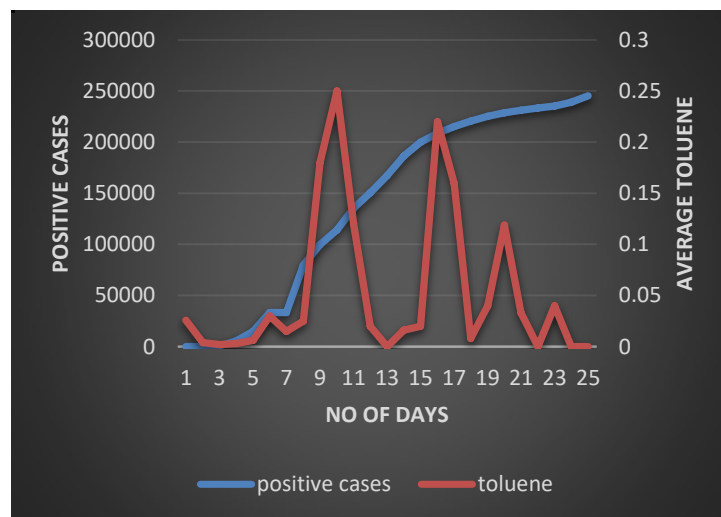


Fig 5.6 The Effect of Toluene on Covid-19

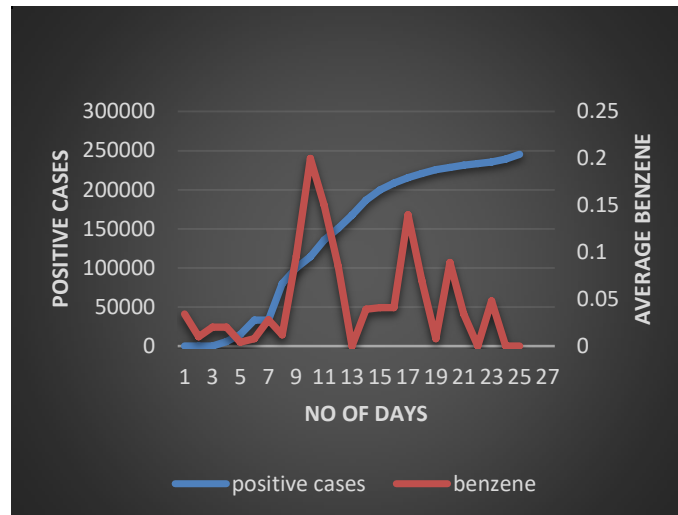


Fig.5.7 The Effect of Benzene on Spreading Covid-19

DISCUSSION

Viruses do not reproduce outside of living cells, but infectious viruses can survive on infected environmental surfaces for long periods of time, with temperature and humidity having a major effect on the length of viable virus survival. In both the hospital and the environment, contaminated surfaces have been identified as important vectors for the transmission of infections. It has been known that fomites play a role in RSV transmission. After drying, the human coronavirus linked to the common cold was found to be viable for just 3 hours on environmental surfaces, despite remaining viable in liquid suspension for several days.

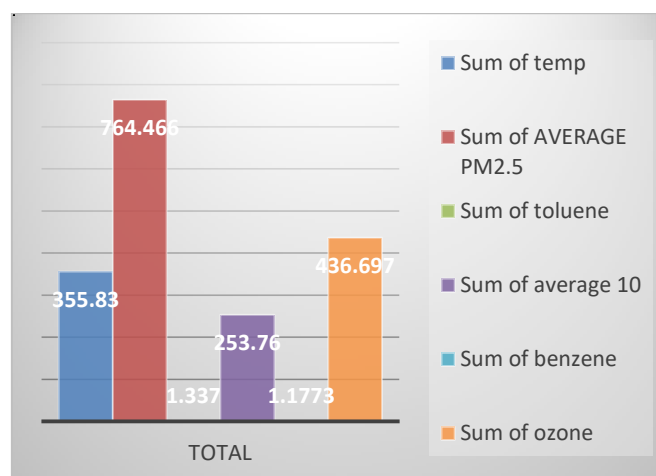


Fig.5.8.Average Air parameters

SARS CoV has been shown to live for at least two weeks after drying in temperature and humidity conditions similar to those found in an air-conditioned climate. The virus can live for three weeks in a liquid environment at room temperature, but it is quickly killed by heat at 56°C for 15 minutes. These findings suggest that contaminated surfaces can play a significant role in infection transmission in both the hospital and the community. We discovered that high temperatures combined with high relative humidity have a synergistic impact on SARS CoV viability inactivation, while lower temperatures and low humidity support virus survival on infected surfaces for longer periods of time.

CHAPTER 6

SUMMARY AND CONCLUSION

According to research, air pollution may be a factor in the coronavirus disease 2019 (COVID-19) pandemic. However, the precise links between air pollution and SARS-coronavirus-2 infection are unknown. After adjusting for the effects of ambient daily temperature and humidity, month, and year, our results indicated a clear positive relationship between PM_{2.5} and ILI risk during the flu season (October-April) (p-value 0.001), while no significant association was observed during the non-flu season (May-September) (p-value = 0.174). PM_{2.5} has a short-term delayed effect, with a 2-day moving average (current day to previous day) of PM_{2.5} providing the greatest predictive capacity.

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