

The lockdown due to COVID19 pandemic: Impact on the environment pollution

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Abstract- The environmental air is affected by increasing particulate issues, which further influence human and animal health. It is caused by the blend of agents, such as chemical, biological and radioactive matters to the air. There is a standard range of ambient air contaminants to maintain the healthy air for human life. It is necessary to maintain air quality to avoid hazardous effects on life. According to world health organization (WHO), anthropogenic contaminants makes unhealthy air day-by-day in India. The present study aimed to analyze the variation in environmental factors during the period of March 2020 to May 2020. The effect of variation in these parameters is measured on Dwarka, Delhi's ambient air. The testing was performed with the help of ITC laboratory to collect the data. The data of different time zones are collected and compared to observe the impact of lockdown on the environmental air of Delhi. The improvement in the environment and most influential factors are highlighted. The comparative analysis of data for pre and post-lockdown has been performed, providing the significance of individual parameters. The impact of parameters on ambient air of Delhi is also compared with the standard data released by government.

Keywords: Human Health; Corona virus, environment factors

I. INTRODUCTION

The blend of agents, like chemical, carbon and other radioactive matters to the environment creates the air pollution. To retain the healthy human life it is necessary to maintain the air quality of a standard that avoids hazardous [1]. According to world health organization (WHO), anthropogenic contaminants makes unhealthy air in India every year. The national capital region (NCR) of Delhi and Kolkata are the two metro cities with poor air quality in India [2]. The WHO acknowledged occurrence of the novel coronavirus COVID-19 in March 2020. The COVID19 declared as global pandemic by WHO on 11th March 2020. At the same time, COVID19

infection is a big threat for human health worldwide. The COVID-19 pandemic becoming dominant and spreading continuously. A confirmed cases on July 12, 2020 were over 12.80 million 12507849 over 570 thousands deaths worldwide [3]. The transmission of COVID19 virus through respiratory droplets to human was confirmed by WHO in January 2020. Many researchers and media reported that the air pollution decreased during national lockdown. In second most populated country i.e. India, the Janta Curfew was announced on March 22, 2020 and consequently, a national lockdown of three weeks was extended on March 24, 2020 [4].

Based on the reports COVID-19, which is the new coronavirus initiating exceptional pneumonia, outspread in Wuhan, China on December 31, 2019 [5–7]. Thereafter, global spread of COVID-19 infection threatened the human life worldwide [8]. The reports of research studies, media and government organizations show that the lockdown due to COVID19 affected the human life but at same time it provided the positive effect to the environmental air across India [3, 4] [24]. The COVID19 pandemic impacted various factors such as environment pollution, sustainability, waste management, air quality and wildlife, etc. The reduction in waste and hazardous factors of air have been measured during the lockdown period over the country. A significant improvement in ambient air was resulted by some action of government. Based on the reviewed literature, the present study aimed to analyze the variation in sulfur dioxide (SO₂), nitrogen Dioxide (NO₂), particulate matter (PM₁₀), particulate matter (PM_{2.5}), ozone (O₃) and ammonia (NH₃). The effect of variation in these parameters is measured on Dwarka, Delhi's ambient air. The improvement in environment and most influential factors are highlighted. The findings of present study will be

helpful to the people engaged in the search of environmental factors for improving the air quality of Delhi region.

II. METHODOLOGY

The major steps of methodology to achieve the objective of study are highlighted in Figure 1. To prepare a valid and conceptual theme for analysis the literature has been explored and then matches with the observed data.

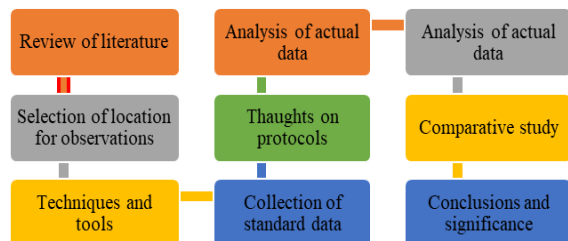


Figure 1 Steps of overall methodology

The extracted sample must be Cover/Cap. The marking should be done for necessary identification. Prior to the analysis the sample keeps in the place of 4°C temperature. The samples ready to Inject are shown in Figure 2.

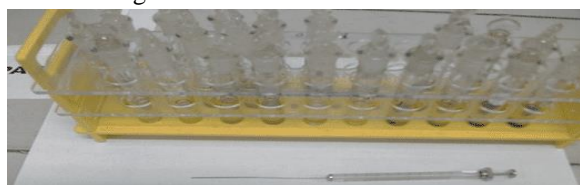


Figure 2 samples ready to Inject

III. RESULTS AND DISCUSSION

The observations have been performed to record the values of selected environmental factors. The data has been recorded in two months i.e. during 1st March to 15th March 2020 and 15th May to last May 2020. The observed results are compared with the standard data. It is found that the air quality in lockdown period has improved significantly.

Analysis of Sulphur dioxide (SO₂)

The results obtained for Sulphur dioxide in ambient air of Delhi during March and May 2020 are plotted in Figure 3. It also consists the standard value for the comparison of observed values. The graph shows that the concentration of SO₂ is diminishes from March to May month. Even it came just close to the required value for the safe environment.

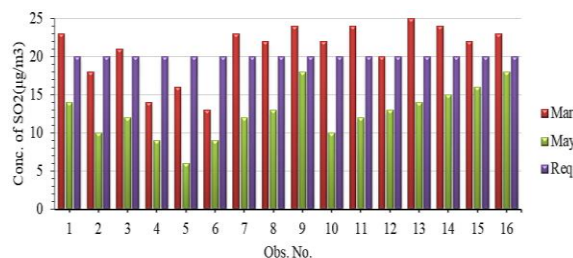


Figure 3. Analysis of SO₂

Analysis of nitrogen dioxide (NO₂)

The observations on Nitrogen dioxide in ambient air of Delhi during March and May 2020 with the standard value for the comparison are plotted in Figure 4. The graph shows that the concentration of NO₂ is reduced from March to May month. The result shows that it became below the required value.

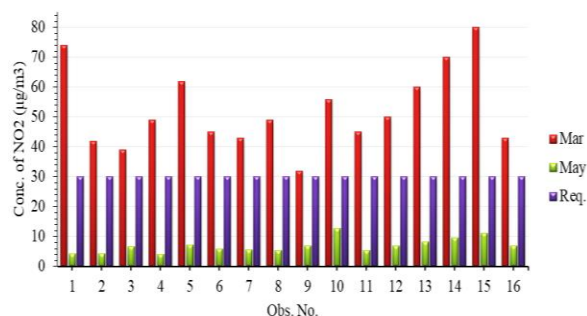


Figure 4 Analysis of NO₂

Analysis of Particulate matter (PM₁₀)

The results observed for particulate matter (PM₁₀) in ambient air of Delhi during March and May 2020 with standard values are shown in Figure 5. The graph shows that the concentration of PM₁₀ is better for the safe environment after the lockdown.

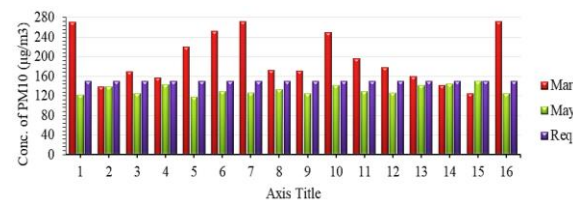


Figure 5 Variation in Particulate Matter (PM₁₀)

Analysis of Particulate matter (PM_{2.5})

The observations on PM_{2.5} in ambient air of Delhi during March and May 2020 are graphically represented in Figure 6. It is also consists the required value for the comparison of observed values. The

graph shows that similar to other parameters the concentration of PM_{2.5} is reduces during lockdown period. Even it matches to the required value for the safe environment of Delhi.

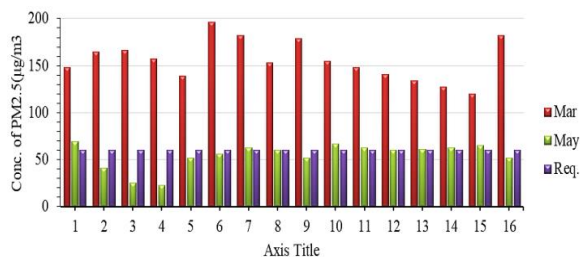


Figure 6 Analysis of Particulate Matter (PM_{2.5})

Analysis of ozone (O₃)

The data of ozone (O₃) in ambient air of Delhi during March and May 2020 is graphically shown in Figure 7 with required value for the comparison of results. The graph shows that the concentration of PM_{2.5} is improved during lockdown period from March to May 2020. In comparison to the previous year it is significantly improved.

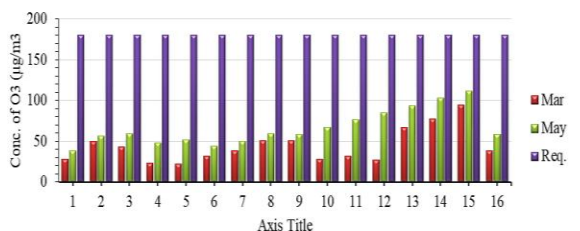


Figure 7 Analysis of ozone (O₃)

Analysis of Ammonia (NH₃)

The results observed for Ammonia (NH₃) in ambient air of Dwarka, Delhi during the months March and May 2020 with standard values are shown in Figure 8. The graph shows that the concentration of Ammonia is improves for the safe environment after the lockdown. Similar, process has been followed to investigate rest of parameters. The effect of parameters measured and compared with previous data and standards.

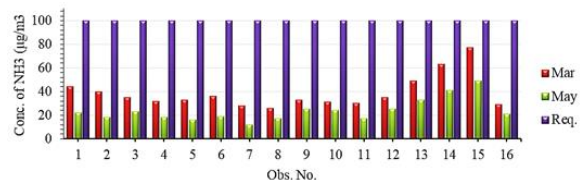


Figure 8 Analysis of Ammonia (NH₃)

Comparative analysis

It is observed that the average values of almost all environment parameters improved after lockdown. For example the PM_{2.5} in May 2019 was 172, which is reached to 35 in May 2020. In similar manner other environmental parameters such as PM₁₀, NO₂, NH₃, SO₂, CO and Ozone are 329, 61, 6, 38, 39 and 115 in May 2019 whereas these parameters are 65, 19, 12, 24, 27 and 75 respectively in May 2020. From the air quality data plots, a significant enhancement in ambient air was found by the lockdown. The major environmental factor with percentage improvement is shown in Table 1.

Table 1 Percentage improvement in major factors of ambient air due to lockdown

Factors	Pre-Lockdown	Lock-down	Improve (%)
PM ₁₀ (µg/m ³)	271	142	47.6
PM _{2.5} (µg/m ³)	148	67	54.73
CO (µg/m ³)	1.2	0.5	58.33
NO ₂ (µg/m ³)	74	12.8	82.7
SO ₂ (µg/m ³)	23	10	56.52
Ozone (µg/m ³)	28	67	139.29
NH ₃ (µg/m ³)	44	24	45.45

The required value of factors in ambient increase or decrease depending upon the human activities. The results predict the major contribution of environmental parameters for healthy ambient in Delhi. The major advantages of such studies is to select the most influencing factors in ambient air of a particular place. When we want to develop a new system to control the safe air quality, then the suggestions of such study provides the significant information to considerable parameters for system. The design of any system without pre-requisition analysis and affecting factors may not provide satisfactory output. The improvement in environmental factors including PM₁₀, PM_{2.5}, CO, NO₂, SO₂, Ozone and NH₃ is found with 47.60%, 54.73%, 58.33%, 82.70%, 56.52%, 139.29 and 45.45 respectively. The findings of the present study will help the researchers and practitioners who are designing the system with improved AQI index at their location.

IV. CONCLUSION

The effect of variation in environment parameters is measured for ambient air of Delhi. The data of different time zones are collected and compared to

observe the impact of lockdown on the environmental air of Delhi. The improvement in the environment and most influential factors are emphasized. The comparative analysis of data for pre and post-lockdown has been performed, providing the significance improvement of individual parameters. The impact of parameters on ambient air of Delhi is also compared with the standard data released by government which showing a noteworthy improvement in environment.

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