International Journal of Technical Innovation in Modern Engineering & Science (IJTIMES)
Impact Factor: 5.22 (SJIF-2017), e-ISSN: 2455-2585
Volume 4, Issue 08, August-2018

AIR POLLUTION TREND ANALYSIS IN VARIOUS DISTRICTS OF HARYANA REGION

[1]Naveen Punia, [2]Dr.Sanjay Sharma

[1]ME Scholar, Department of Civil Engg.,
National Institute Of Technical Teachers Training And Research, Chandigarh.

[2]Professor and Head, Department of Civil Engg.,
National Institute Of Technical Teachers Training And Research, Chandigarh.

Abstract:- Due to alarming level of pollution in many cities of India, various studies are being carried out in different regions in order to tackle this problem. Various pollutants and its concentration levels are being monitered on hourly and daily basis. In this present study, the main focus is to cover various districts of harayana with respect to the concenteration and health risk associated with main pollutants like CO, SO2, NO2, Ozone and PM2.5.

Keywords: Air Pollution, Air Pollution Trend Analysis, Air Pollutants.

1. Introduction

Environmental pollution has always accompanied modernisation. With the growth of urbanization, pollution is increasing which is the main cause of degradation of environment. Pollution with hazadous pollutants are affecting the health and surroundings of human being. Even a simple fire creates pollution as it involves burning of coal and wood. Modern technology is a boon and a bane to the mankind. Modern and large scale construction leads to deforestation which is the root cause of many types of pollution. Industrial revolution has infused many hazardous and inert untreated pollutants into the water bodies which sverely affects the aquatic and human life. It was said ealier that industrial revolution was the one that gave rise to environmental pollution.

Environmental pollution, or simply polltuion, generally means the introduction of pollutants (contaminants) into the natural environment which causes severe after effects. Pollution can be in the form of chemical substance (such as unwanted material or gases in air, water or soil) and energy (such as noise, heat, light etc). The unwanted substance, energy or gas which are occuring naturally or artifically is called pollutant. These pollutants contaminte the purity of the environment and are detrimental to health of aquatic and human life and environment itself as well. Pollution is generally classified as follows:

- Point Source pollution
- Non-point source pollution

Rapid urbanization and large population has resulted in sudden increase in air pollution emissions due to various means such as transportation, industrial activity, and energy production all concentrated in heavily populated areas. The impact on ecosystem is adverse in most cities and states of highly populated areas due to the high concentration of pollution in air.

Few common substances emitted into the atmosphere by human activity are mentioned as under:

- Carbon dioxide (CO_2): It has given the name of 'the leading pollutant'. It is generally emitted by burning fossil fuel or by greenhouse effect.
- Sulphur Oxides (SO_x): it is introduced by volcanic eruptions and by indutries. Coal and petroleum often contain suphur compounds and combustion of these substance results in suphur oxides.
- Nitrogen Oxides (NO_x): It is generated by the combustion of substance at high temperature and are also produced during thunderstorms. Natural dioxide is a chemical compound which is one of the most prominent air pollution.
- Carbon Monoxide (CO): It is colorless, odorless toxic but non irritating gas. It is generated by the combustion of natural gas, coal and wood. Exhaust from the vehicles contributes to the maximum of CO which creates the smog type formation in the air which causes lung infection and disease etc.

Previously, many researches were done such as Naresh Kumar et al. (2009) examined the spatial distribution of air pollution in response to recent air quality regulations in Delhi, India, W. K. Kupolati (2010) involved environmental impact assessment of upgrading of existing flow station dealing with different civil engineering works such as road network, housing, water supply, Keiko Hirota et al. (2017) discussed various methods of estimating the health effects of air pollution in large Asian cities etc.

2. Research Program

The main objectives which was covered during the whole study are mentioned below:

- To collect data with respect to Air Quality Parmaters.
- To collect the data related to the concenteration of different Air Pollutants.
- Trend analysis of air quality in various District of Haryana.
- Impact of air pollution on human health.
- To suggest remedial measures to prevent Air Pollution.

The raw data was collected (from 1st November 2017 – 31st july 2018) from the pollution control department i.e. Central Pollution Control Board (CPCB). Concentration of different air pollutants (CO, SO2, NO2, Ozone, PM2.5) were collected for four different cities of haryana which were grouped into three zones mentioned as under:

Table 1: Four monitoring Stations of Haryana

Zone	City	Station
North Zone	Panchkula	Sector-6, Panchkula, Haryana.
South Zone	Gurugram	Vikas Sadan, Gurgaon, Haryana.
	Faridabad	Sector- 16A, Faridabad, Haryana.
Central Zone	Rohtak	MD University, Rohtak, Haryana.

Then the raw data was analyzed in a scrutinized manner and graphs were prepared. The average monthly concentration of different pollutants were also calculated from the collected data by taking the mean value. Average monthly concentration helped us in better understanding of the concept of present study.
Comparion was done between the concentration of different air pollutants in winters and summers. For this, period of 3 months i.e. 1st november 2018 to 31st january 2018 was considered for winters and period of 3 months i.e. 1st may 2018 to 31st july 2018 was considered for summers. At the end, final conclusions were made from this comparison.

3. Results

The results of different air pollutants which were collected during this study from the period of 1st November 2017 to 31st July 2018, is represented in a tabular form. From this collected data, scrutinized study was done and an attempt is made to analyze the data for concenteration of air pollutants in winters (1st November 2017 to 31st January 2018) and in summers (1st May 2018 to 31st July 2018). Comparison between these two seasons were also carried out.

3.1. Results of different air pollutants for North Zone: Panchkula (Station: Sector-6, Panchkula, Haryana)

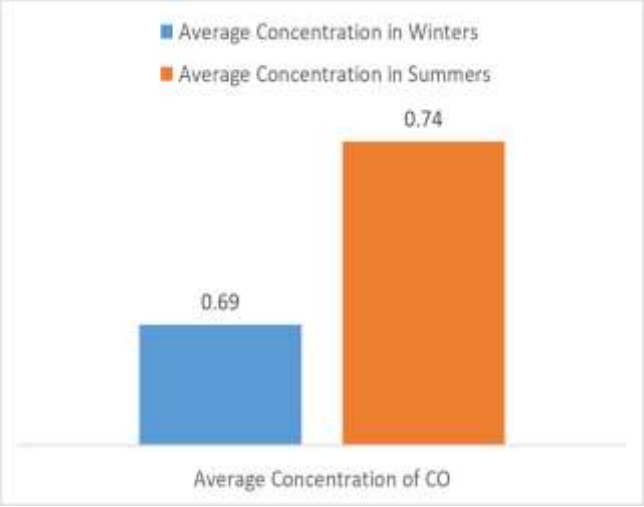

Fig. 1. Average Concentration of CO in winters and Summers in Panchkula.

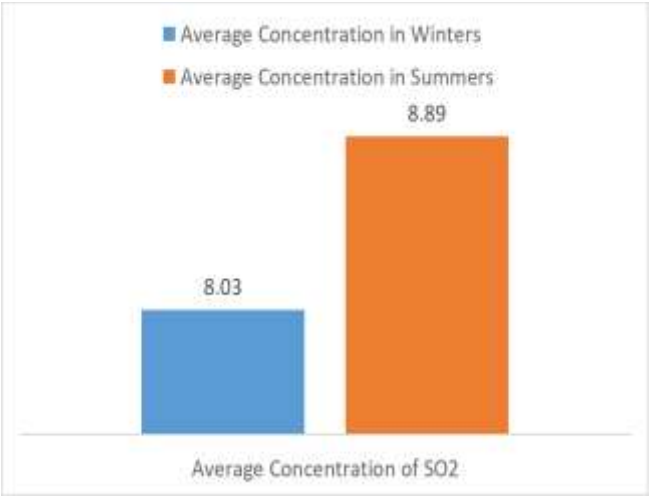

Fig. 2. Average Concentration of SO2 in winters and Summers in Panchkula.

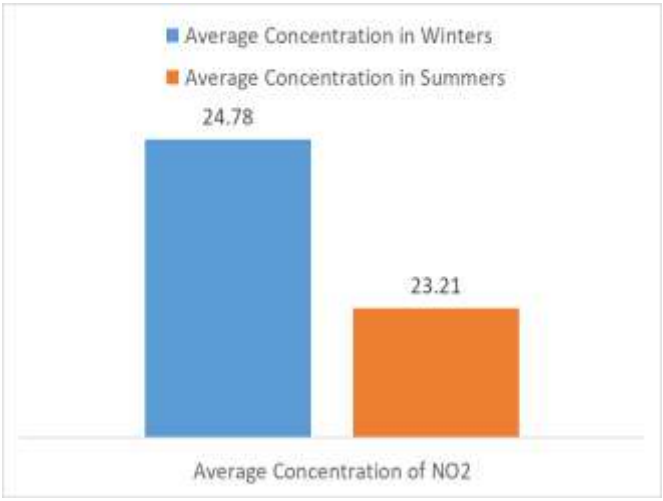

Fig. 3. Average Concentration of NO2 in winters and Summers in Panchkula.

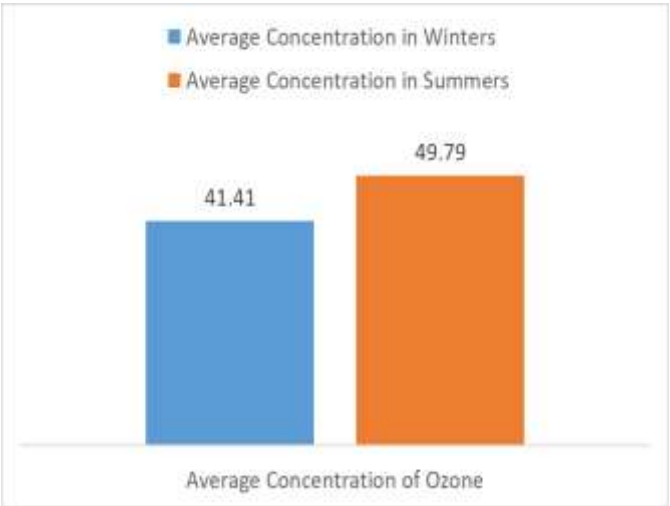

Fig. 4. Average Concentration of OZONE in winters and Summers in Panchkula.

From Fig. 1, Fig. 2 and Fig. 4, it can be clearly seen that the average concentration of CO, SO2 and Ozone is high in summers than winters.

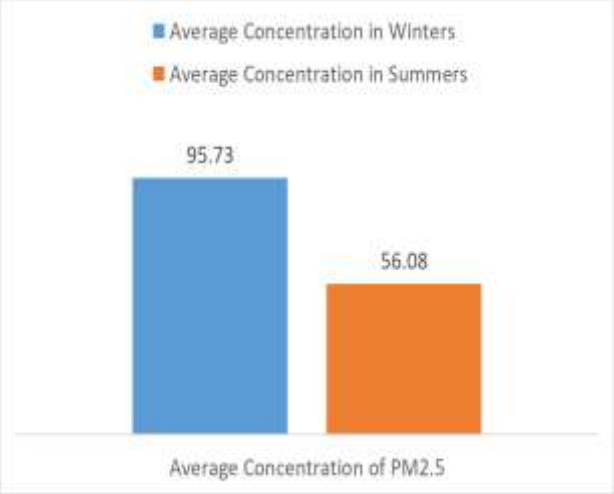

Fig. 5. Average Concentration of PM2.5 in winters and Summers in Panchkula.

From Fig. 3 and Fig. 5, it can be clearly seen that the average concentration of NO2 and PM2.5 is high in winters than summers.

3.2. Results of different air pollutants for Central Zone: Rohtak (Station: MD University, Rohtak, Haryana)

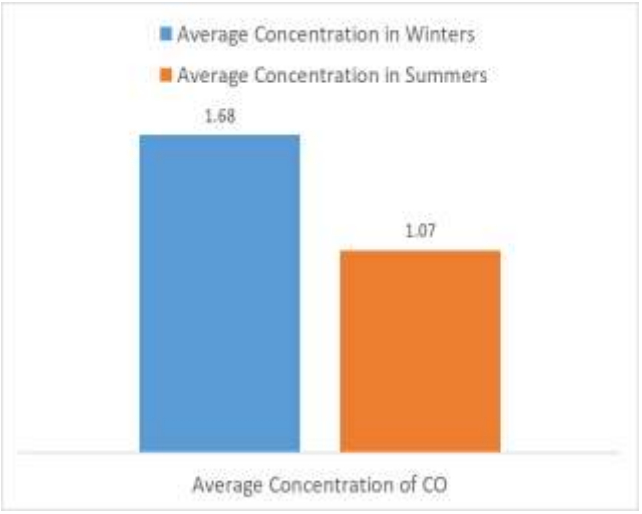

Fig. 6. Average Concentration of CO in winters and Summers in Rohtak.

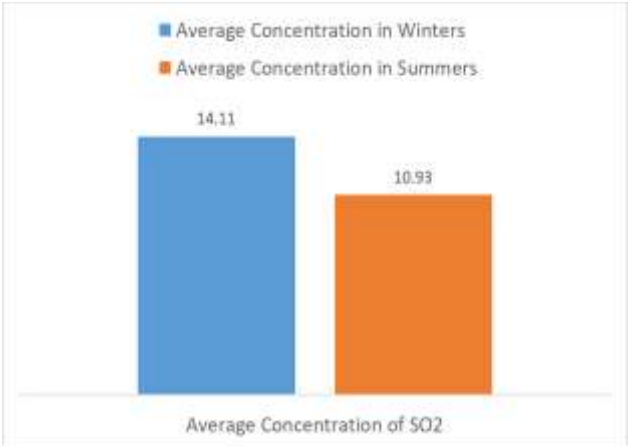

Fig. 7. Average Concentration of SO2 in winters and Summers in Rohtak.

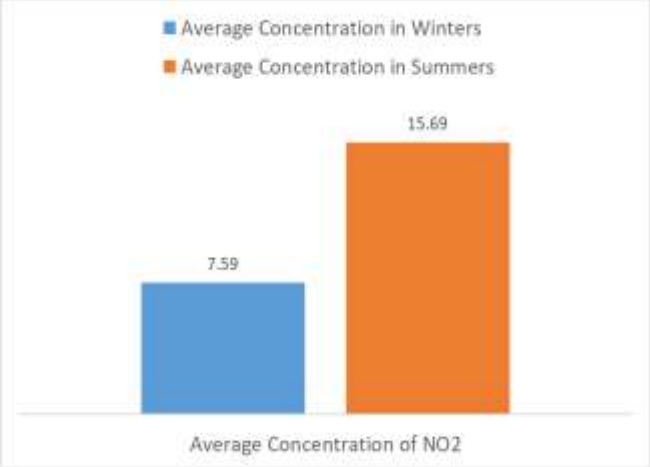

Fig. 8. Average Concentration of NO2 in winters and Summers in Rohtak.

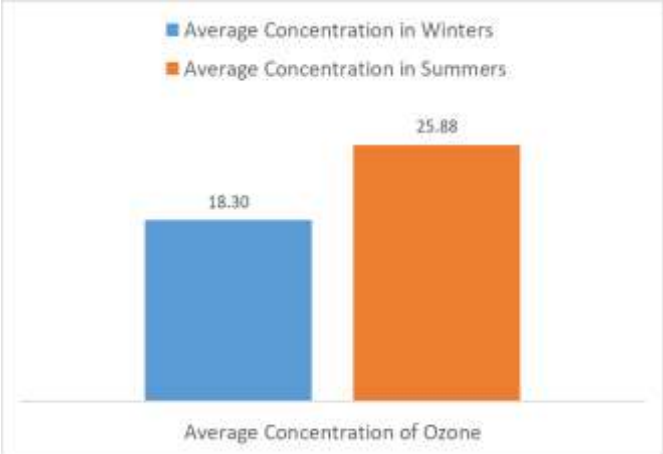

Fig. 9. Average Concentration of OZONE in winters and Summers in Rohtak.

From Fig. 8 and Fig. 9, it can be clearly seen that the average concentration of NO2 and Ozone is high in summers than winters.

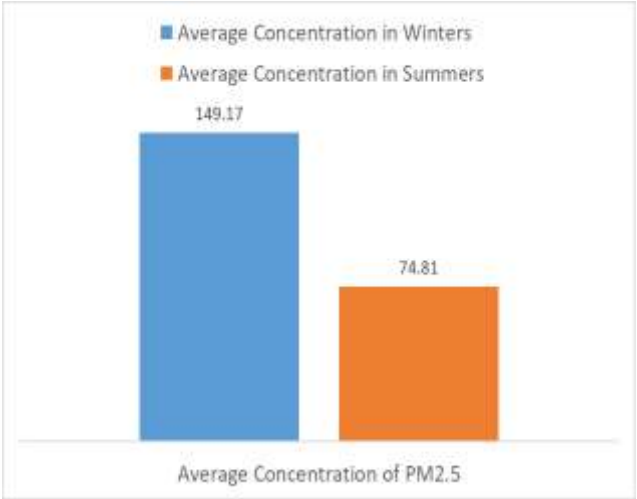

Fig. 10. Average Concentration of PM2.5 in winters and Summers in Rohtak.

From Fig. 6, Fig. 7 and Fig. 10, it can be clearly seen that the average concentration of CO, SO2 and PM2.5 is high in winters than summers.

3.3. Results of different air pollutants for South Zone: Gurugram (Station: Vikas Sadan, Gurgaon, Haryana)

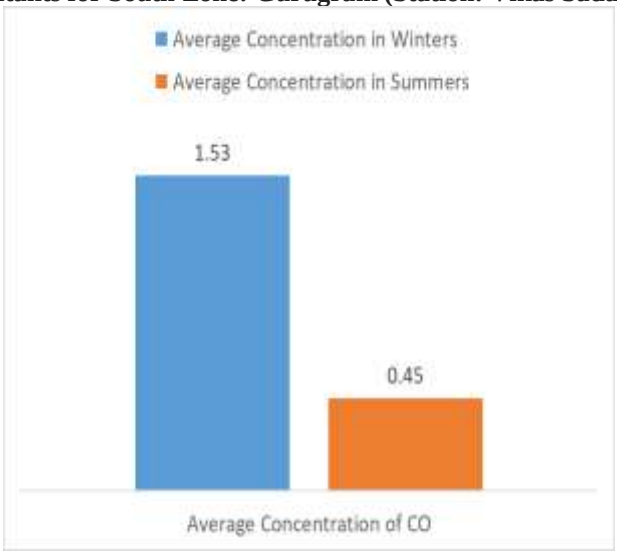

Fig. 11. Average Concentration of CO in winters and Summers in Gurugram.

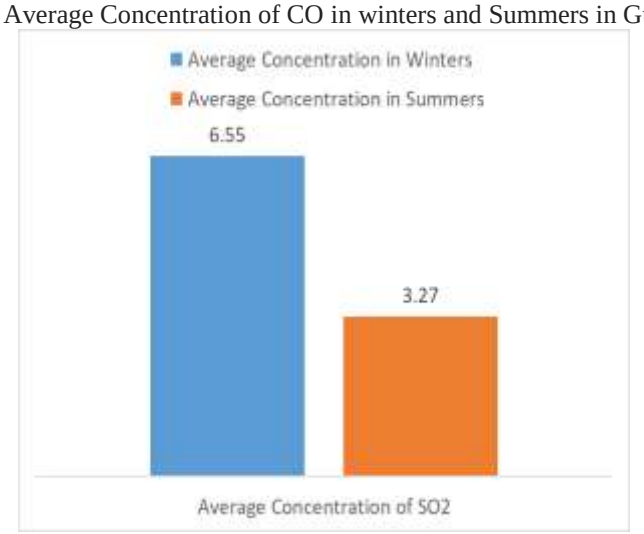

Fig. 12. Average Concentration of SO2 in winters and Summers in Gurugram.

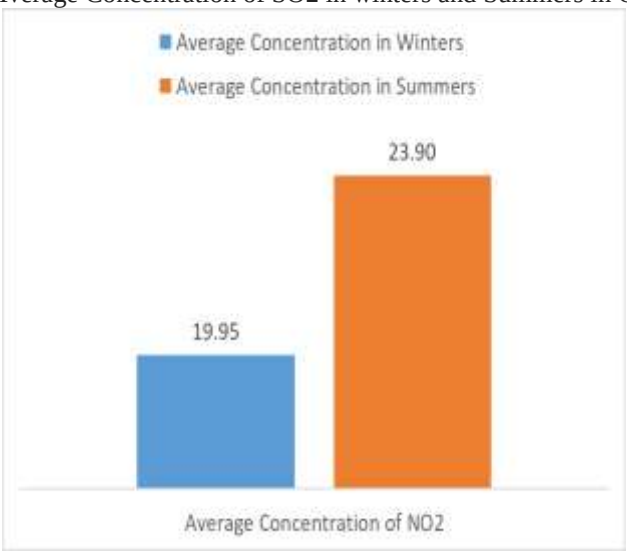

Fig. 13. Average Concentration of NO2 in winters and Summers in Gurugram.

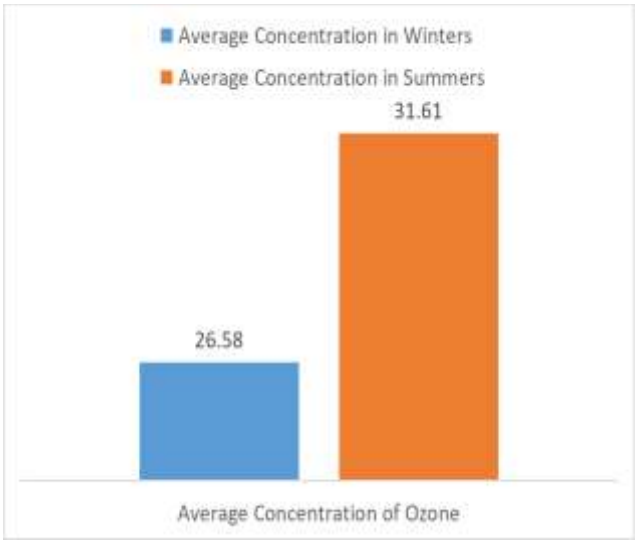

Fig. 14. Average Concentration of OZONE in winters and Summers in Gurugram.

From Fig. 13 and Fig. 14, it can be clearly seen that the average concentration of NO2 and Ozone is high in summers than winters.

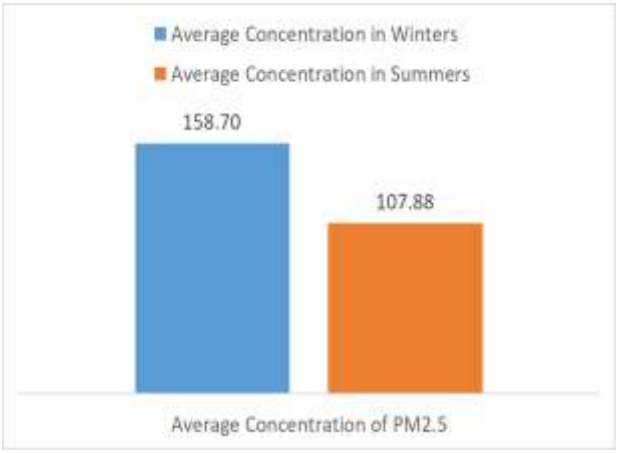

Fig. 15. Average Concentration of PM2.5 in winters and Summers in Gurugram.

From Fig. 11, Fig. 12 and Fig. 15, it can be clearly seen that the average concentration of CO, SO2 and PM2.5 is high in winters than summers.

3.4. Results of different air pollutants for South Zone: Faridabad (Station: Sector- 16A, Faridabad, Haryana)

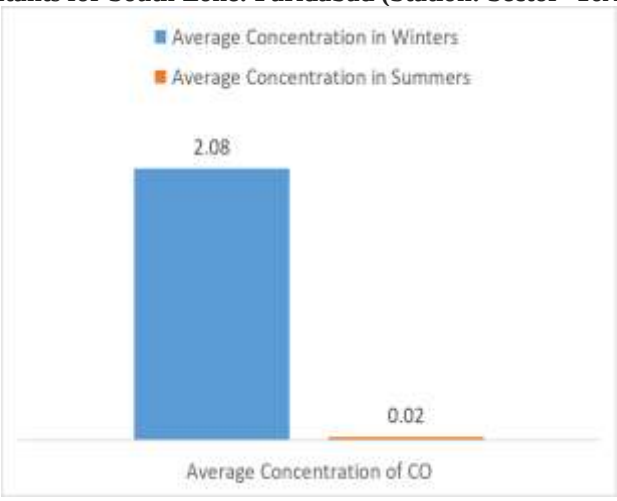

Fig. 16. Average Concentration of CO in winters and Summers in Faridabad.

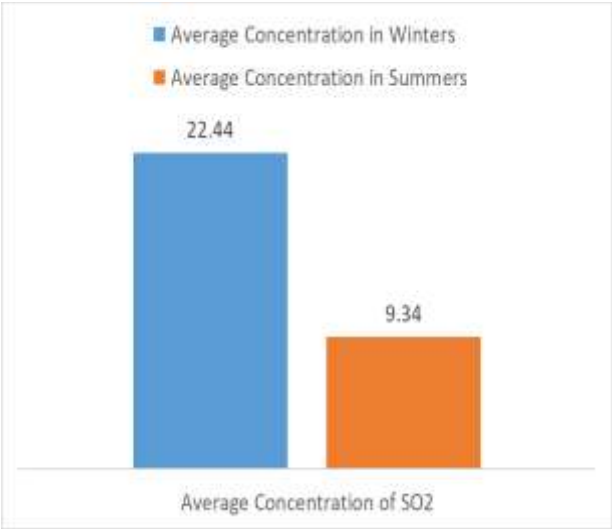

Fig. 17. Average Concentration of SO2 in winters and Summers in Faridabad.

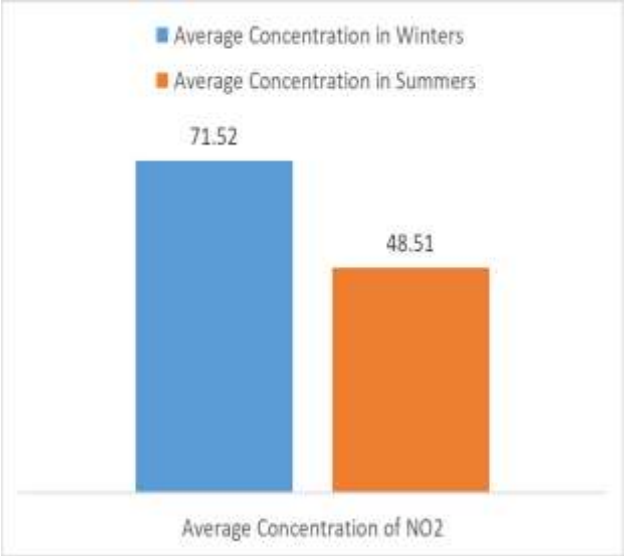

Fig. 18. Average Concentration of NO2 in winters and Summers in Faridabad.

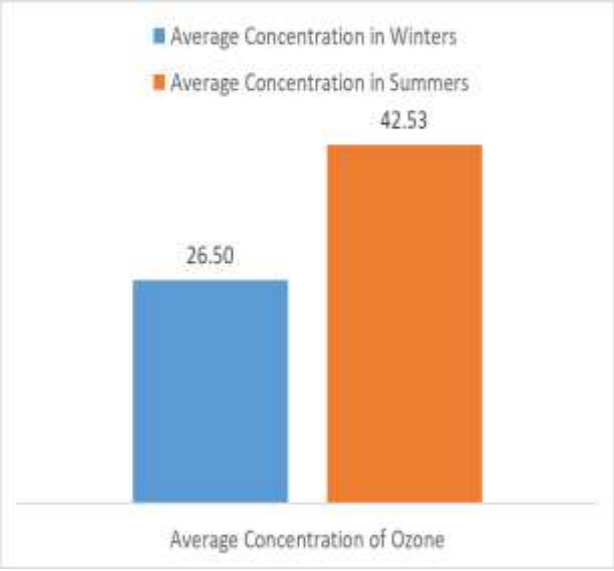

Fig. 19. Average Concentration of OZONE in winters and Summers in Faridabad.

From Fig. 19, it can be clearly seen that the average concentration of Ozone is high in summers than winters.

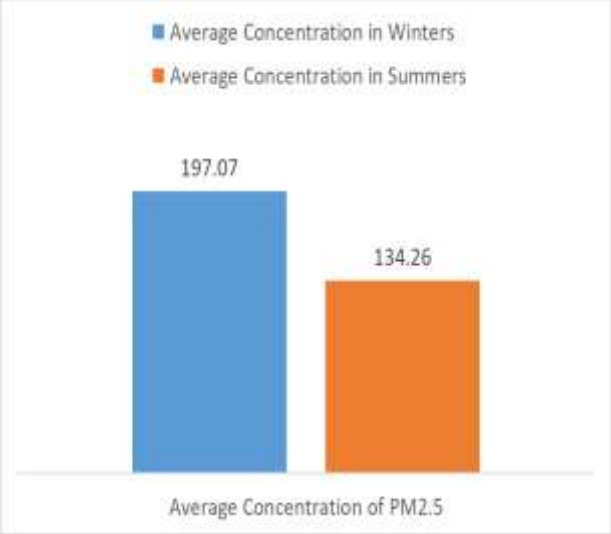

Fig. 20. Average Concentration of PM2.5 in winters and Summers in Faridabad.

From Fig. 16, Fig. 17, Fig. 18 and Fig. 20, it can be clearly seen that the average concentration of CO, SO2, NO2 and PM2.5 is high in winters than summers.

4. Conclusion

1. For Panchkula, the average concentration of NO2 and PM2.5 in winters is more than the concentration in summers. Whereas the average concentration of CO, SO2 and Ozone in winters is less than the concentration in summers.
2. For Rohtak, the average concentration of CO, SO2 and PM2.5 in winters is more than the concentration in summers. Whereas the average concentration of NO2 and Ozone in winters is less than the concentration in summers.
3. For Gurugram, the average concentration of CO, SO2 and PM2.5 in winters is more than the concentration in summers. Whereas the average concentration of NO2 and Ozone in winters is less than the concentration in summers.
4. For Faridabad, the average concentration of CO, SO2, NO2 and PM2.5 in winters is more than the concentration in summers. Whereas the average concentration of Ozone in winters is less than the concentration in summers.

5. References

I. Naresh Kumar (2009) “Air quality interventions and spatial dynamics of air pollution in Delhi and its surroundings”, nt. J. Environment and Waste Management, Vol. 4, Nos. 1/2, pp. 85-111.
II. W. K. Kupolati (2010) “Environmental Impact Assessment of Civil Engineering Infrastructure Development Projects”, International Journal of Sustainable Development, Vol. 2, Issue-4, pp. 57-66.
III. N. Venkat Rao, M. Rajasekhar, Dr. G. Chinna Rao (2014) “Detrimental effect of Air pollution, Corrosion on Building Materials and Historical Structures”, American Journal of Engineering Research (AJER), Vol. 3, Issue-3, pp. 359-364.
IV. Nasr Ahmed AL-Dhurafi, Nurulkamal Masseran, Zamira Hasanah Zamzuri, Muhammad Aslam Mohd Safari (2017) “Modeling the Air Pollution Index based on its structure and descriptive status”, Springer.
V. Keiko Hirota, Shogo Sakamoto, Satoshi Shibuya and Shigeru Kashima (2017) “A Methodology of Health Effects Estimation from Air Pollution in Large Asian Cities”, Environments 2017, 4, 60; doi:10.3390/environments4030060, pp. 1-14.
VI. Evi Dons, Michelle Laeremans, Esther Anaya-Boig, Ione Avila-Palencia, Christian Brand, Audrey de Nazelle, Mailin Gaupp-Berghausen, Thomas Götschi, Mark Nieuwenhuijsen, Juan Pablo Orjuela, Elisabeth Raser, Arnout Standaert, & Luc Int Panis (2018) “Concern over health effects of air pollution is associated to NO2 in seven European cities”, Springer.