

Ambient Air and Noise Pollution Study at Bhopal Vigyan Mela 2016, Madhya Pradesh, India

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Abstract This study reported ambient air and noise quality of three days Vigyan Mela 2016 which held at Bhopal city of Madhya Pradesh, India by measuring the concentration of particulate matter, Heavy metals, Poly aromatic hydrocarbon, Sulphur dioxide (SO₂), Oxides of nitrogen (NO_x), in ambient air and noise level using standard methods. People's activity, vehicle emission, transport and anthropogenic activity are responsible for a considerable amount of air pollution and noise pollution. For present study, one ambient air and noise monitoring site was selected during the Bhopal Vigyan Mela. The results concluded that the concentration of the gaseous pollutants are within the standard values of National Ambient Air quality Standards, India but particulate matter in ambient air was found to be at high level at the monitoring site. Noise levels recorded in three days of Mela under commercial zone exceeded the prescribed standard level of 65 dB.

Keywords: *Vigyan Mela, ambient air pollution, noise pollution, particulate matter*

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1. Introduction

Ambient air and noise quality is a major concern throughout the world. Air and noise pollution in urban areas comes from a wide variety of sources. The sources responsible for high emission loads are grouped into several sectors such as transport, domestic commercial and industrial activities for anthropogenic sources. The quality of the ambient air we breathe is fundamental to the quality of life for the growing millions of people living in the world's burgeoning cities and deteriorating urban air quality threatens the public health [3]. Furthermore, airborne emissions from major urban and industrial areas influence both air quality and climate change. Particulate matter (PM), especially PM_{2.5} (particle with aerodynamic diameter less than 2.5 μm) is the most ubiquitous and most complicated ambient air pollutant in urban area [5]. Coarse and Fine particles are a mixture of a variety of different compounds and pollutants that originate primarily from combustion sources. Fine dust particles are either emitted directly from these combustion sources or are formed in the atmosphere through complex oxidation reactions involving gases such as sulfur dioxide and nitrogen oxides [4].

Madhya Pradesh Council of Science & Technology has started the scheme of Vigyan Mela as per directions of Hon'ble Chief Minister, Government of Madhya Pradesh, India, in order to create scientific awareness and science popularization amongst the rural, tribal and urban people

of the State of Madhya Pradesh, India. This is a special scheme under science popularization which organized by Madhya Pradesh Council of Science & Technology and Vigyan Bharti jointly every year in different cities of Madhya Pradesh, India. The Vigyan Mela provides platform to researchers, scientists and students of the State. Many scientific activities such as demonstration of research for new innovators, demonstration of research and development activities, face to face interaction with senior and eminent scientists of the country, patent awareness programme, demonstration of traditional techniques, workshops for skill development, kisan sammelans etc. has been carried out under this Mela.

In the Year 2016 Madhya Pradesh Council of Science & Technology and Vigyan Bharti jointly organized Vigyan Mela at Bhopal, Madhya Pradesh, India from 20th to 22nd February 2016. In present study ambient air and noise quality at Bhopal Vigyan Mela 2016 were monitored by Madhya Pradesh Pollution Control Board, Bhopal, Madhya Pradesh, India.

2. Methodology

2.1. Study Area

Present study place was stall of Madhya Pradesh Pollution Control Board at Barkheda Deshhera Maidan, near Career College, Bhopal during Vigyan Mela 2016, Monitoring work was done on three days of Vigyan Mela from 20- 22 February 2016.

2.2. Analysis of Ambient Air Pollutants

In this study, especially particulate matter (PM_{2.5}, PM₁₀), air toxic gases such as NO_x, SO₂, poly aromatic hydrocarbon, and heavy metals were analyzed.

Ambient air is drawn through a size-selective inlet of the dust sampler Envirotech APM-460 BL and APM 540 equipments. The collected samples were analyzed for various parameters using standard methods prescribed by Central Pollution Control Board, India and originally described by American Public Health Association (1977). Particulate matter that is PM₁₀ and PM_{2.5} were analyzed by gravimetric method. Particulate matter is drawn through preweighed glass fibre filter paper at a flow rate of 0.5 m³/min on 8-hourly basis for 24 hours. Gaseous pollutant NO_x was analyzed by Jacob & Hochheiser method. SO₂ were analyzed by West & Geake method. Poly aromatic hydrocarbon, heavy metals were analyzed by gas chromatography and atomic absorption spectroscopy respectively.

2.3. Noise Level Monitoring

Noise measurements were carried out in "A" weight age using the cirrus sound level meter. The instrument was placed at selected site on a height of about 1.2 meter above the ground. Care was also taken to ensure that no reflections took place near the instrument.

3. Result and Discussion

The ambient air pollution level at Bhopal, Vigyan Mela 2016 is depicted in Table 1. The results concluded that the concentration of the gaseous pollutants is within the standard limits of National Ambient Air Quality Standards as notified by Central Pollution Control Board, India in 2009 but particulate matter is in slightly high level at the Mela monitoring site. In Figure 1, the average value of PM_{2.5} and PM₁₀ was found 65 and 110 µg/m³ respectively. The maximum value of particulate matter was found on second day as compare to first and third day of Mela. NO_x and SO₂ gases concentration in ambient air is almost negligible. Poly aromatic hydrocarbon was not found in ambient air around Mela. Airborn toxic metals are found mainly in particulate matter dispersed in ambient air. While they can be present in almost all sizes of atmospheric particulate, in general, fine particulate carries higher concentrations of toxic metals than coarse particulate. The comparative study of metals concentration at selected monitoring site is depicted in Table 2. In Figure 2, the observed order of the analyzed metals in the ambient air are as Zn>Fe>Cu>Mn>Pb and Cr, Cd, Co, Ni are not found at Mela site. Noise level study at selected monitoring site is shown in Table 3. In Figure 3, noise levels recorded in three days of Mela under commercial zone were exceeded the prescribed standard level of 65 Db.

Table 1. Ambient air pollution level at Bhopal Vigyan Mela 2016

S.No	Particular	Day I	Day II	Day III	Min	Max	Avg	NAAQS Std
1	Weather Condition	Clear	Clear	Clear	-	-	-	-
2	PM _{2.5} (µg/m ³)	53	78	64	53	78	65	60
3	PM ₁₀ (µg/m ³)	102	132	98	98	132	110	100
4	NO _x (µg/m ³)	9.8	12.1	10.3	9.8	12.1	10.7	80
5	SO ₂ (µg/m ³)	BDL	BDL	BDL	BDL	BDL	BDL	80

Remark : BDL –Below Detection Limit
For NO_x >9 µg/m³, SO₂ >2 µg/m³

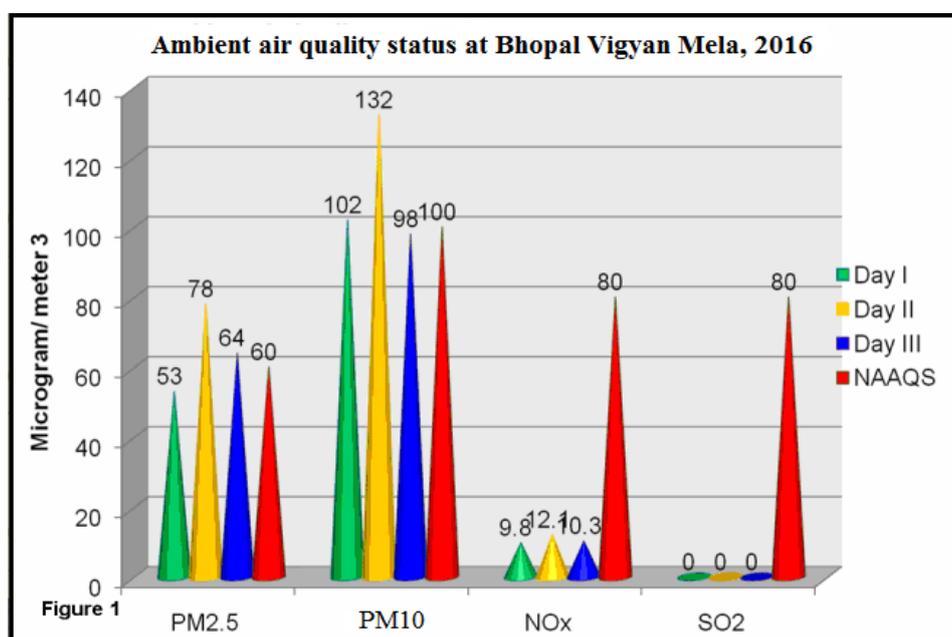


Figure 1.

Table 2. Metal concentration in ambient air at Bhopal Vigyan Mela 2016

S.N	Study Days	Zn (ng/m ³)	Fe (ng/m ³)	Cu (ng/m ³)	Mn (ng/m ³)	Cr (ng/m ³)	Ni (ng/m ³)	Pb (ng/m ³)	Co (ng/m ³)	Cd (ng/m ³)
1	Day I	0.141	0.092	0.001	ND	ND	ND	0.001	ND	ND
2	Day II	0.178	0.163	0.002	0.002	ND	ND	0.004	ND	ND
3	Day III	0.156	0.018	0.001	0.001	ND	ND	0.002	ND	ND

Remark : ND –Not Detectable

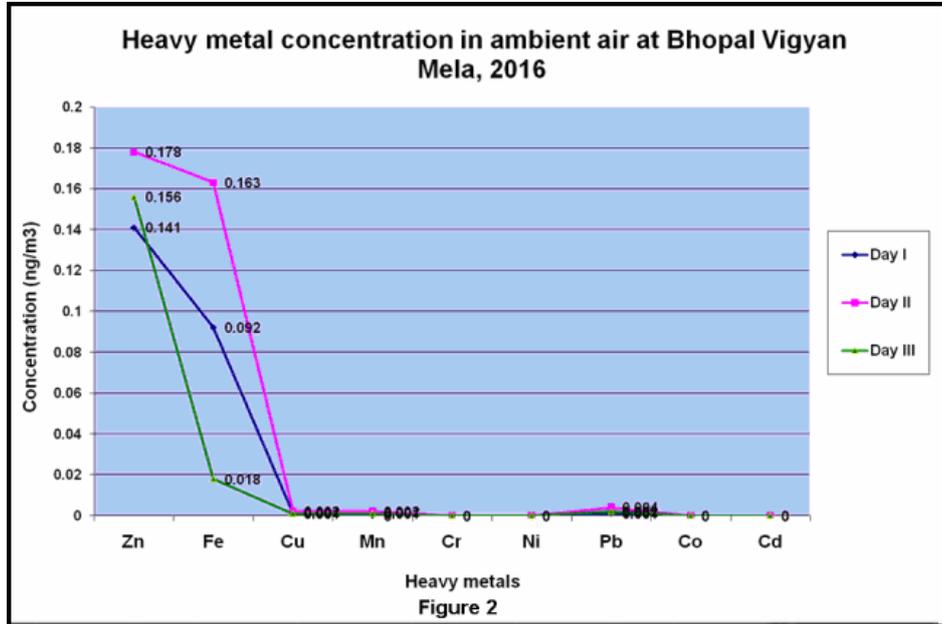


Figure 2.

Table 3. Noise level at Bhopal Vigyan Mela 2016

S.N.	Study day	I (Db)	II (Db)	III (Db)	IV (Db)	V (Db)	VI (Db)	VII (Db)	VIII (Db)	Min (Db)	Max (Db)	Avg (Db)
1	Day I	71.2	64.7	61.3	66.7	71.3	73.2	78.2	69.4	61.3	78.2	69.5
2	Day II	69.8	70.4	78.3	76.4	74.8	78.2	73.1	79.3	69.8	79.3	75.0
3	Day III	68.2	69.8	72.3	69.8	71.6	71.6	74.7	69.7	68.2	74.7	70.9

Remark : Noise standard limit in Commercial Zone is 65Db (Day time)

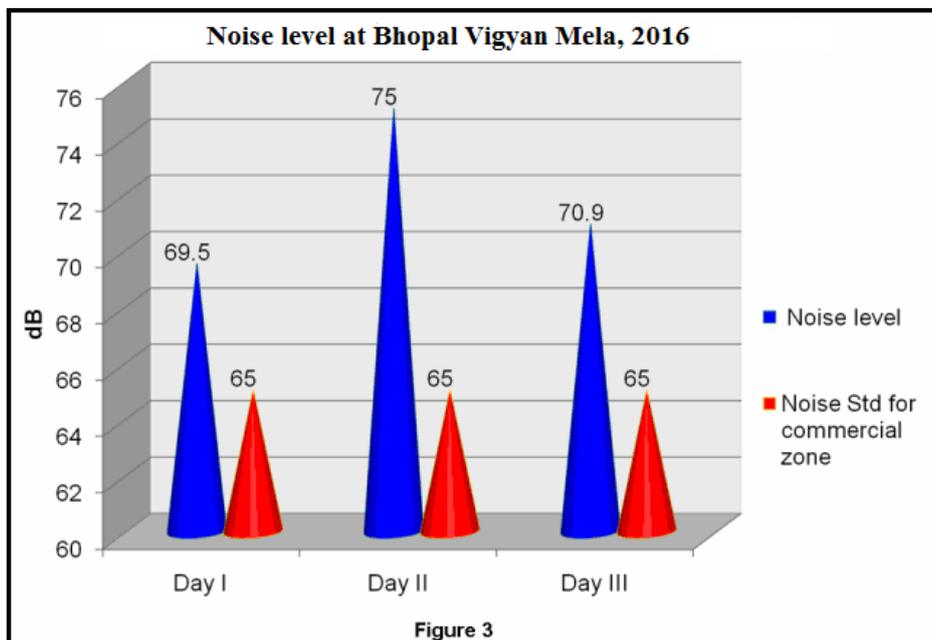


Figure 3.

4. Conclusion

During the study it has been observed that the particulate matter is present in measurable quantities in ambient air. The medium winds during month of February create turbulent conditions and local disturbances in the environment which causes dust conditions. These dust conditions build up high particulate matter levels in the ambient air. People's activity, vehicle emission, transport and anthropogenic activity are responsible for a considerable amount of ambient air pollution. The flow of ill maintained vehicles, honking of air horns, instruments, encroachments and people's activity were the reasons for high noise levels at Bhopal Vigyan Mela 2016.

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References

- [1] Central Pollution Control Acts, rules (1995) and notifications issued there under Pollution Control Series, New Delhi.
- [2] Guidelines for the Measurement of Ambient Air Pollutants Volume-I by Central Pollution Control Board.
- [3] Molina, M.J and Molina, L.T. (2005). Air Quality in the Mexico Megacity: An Integrated Assessment, Springer, New York. mpcost.nic.in/center/134_3_vigyanMela.aspx
- [4] Pope, C. A., Thun M, J., Namboodiri M. M. (1995). Particulate air pollution as a predictor of mortality in a prospective study of U.S. adults. American Journal of Respiratory and Critical Care Medicine, 669-674.
- [5] Verma, A. K., Saxena, A., Khan, A. H and Sharma G. D. (2015) Air pollution problems in Lucknow city, India : A Review. J. Environ. Res. Develop. 04.