

Air Pollutant NO_x at Hyderabad City, Telangana

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Abstract—Population Explosion, Increasing Automobiles, Rapid Industrialization and Urbanization is deteriorating the quality of air in the developing cities in India. In the present investigation NO_x was analysed at IDA Nacharam & Abids. NO_x contributes to Global warming. The concentration of NO_x at Abids was 28.34 µg/m³ while at IDA Nacharam it was 24.70 µg/m³. The Rate of Accumulation for NO_x was 3.85µg/m³ for 1 year, for 10 years its rate will be 38.50µg/m³ & for 50 years it will be 192.50 µg/m³. Steps are taken to be taken to control its emission. This study throws light on the quality of air so that proper initiative measures can be implemented. The Air Quality is important to protect the health of the citizens residing in a particular City.

Key Words : Air Pollutant, NO_x, IDA Nacharam, Abids.

- **INTRODUCTION** NO_x acts mainly as an irritant affecting the mucosa of the eyes, nose, throat and respiratory tract. Extremely high- dose of exposure [as in building fire] to NO_x may result in pulmonary edema and diffuse lung injury. Continuous exposure to high NO_x levels can contribute to the development of acute or chronic bronchitis. Low level of NO_x exposure may increase bronchial reactivity in asthmatics, decreased lung function in patients with chronic obstructive pulmonary disease and increased risk of respiratory infections, especially in young children. In homes with gas stoves, kerosene heaters or un-vented gas space heaters, indoor levels often exceed outdoor levels. Despite the improved performance of technology is presently insufficient to counteract the growth of vehicles and associated pollution problems. Shyamala & Johnson [2018] studied Air Quality Index at Abids, Hyderabad. Shyamala(2016) worked on Study of Air Pollutants and its effect on Plants in Hyderabad City. Shyamala & Johnson (2015) studied Plants as Air Pollutant Absorbers – Modified APTI Abids, Hyderabad Telangana. Shyamala & Johnson (2015) worked on Modified Air Pollution Tolerance Index of selected plants in Nacharam Industrial area – Telangana. Johnson et.al [2015] studied Plants as Bio-indicators Based on Air Pollution Tolerance Index at Hyderabad City. Cynthia & Shailaja [2005] worked on Air pollution Tolerance Index of Certain Plants of Hyderabad City-Balanagar.

- **Materials & Methods** The present study was carried out at two different sites during the year August 2009-2011 July. The First Site was purely an industrial site, **IDA Nacharam**, which is located in Malkajgiri Mandal of Ranga Reddy district. While the second site is commercial, **Abids** Nampally Mandal of Hyderabad district. The First Site under study lies in the Eastern part of Ranga Reddy district, Malkajgiri mandal & is known as **IDA-Nacharam**. This is approximately 13 Km from Secunderabad Railway Station. The Industrial workers are exposed to the air pollutants along with the common public who reside in the peripheral region of **IDA-Nacharam**. The Second Site-**Abids** is located at a distance of 1/2 km from Nampally Railway Station. It lies in the western part of Hyderabad District, Nampally Mandal. It is the main National Highway. It connects Old city on one side & on the other side it connects Mehdiapatnam; via Koti it connects Malakpet to Dilshuknagar. This Study was undertaken to see the quality of air at these Sites and how far it is safe for the health of Industrial workers and common public at both the sites respectively. The chief Air Pollutant **NO_x**, was monitored regularly for two years. **NO_x** was estimated by Jacob & Hoccheiser method [1958].

Results & Discussion - In the present work study of **NO_x** was carried at 2 – Sites, **Site-1 IDA Nacharam, Site-2 Abids** for a Period of 2- years i.e, Aug 2009 –July 2011.

NO_x : Oxides of Nitrogen such as N₂O, NO & NO₂. NO₂ is usually represented by symbol NO_x. The Chief Pollutant NO_x is given off in many forms, such as Smog [or] particles. NO is oxidized to NO₂ in a Polluted atmosphere through Photochemical reactions. It contributes to global warming & hampers Plant growth.

NO_x acts mainly as an irritant affecting the mucosa of the eyes, nose, throat and respiratory tract. Low level of NO_x exposure may increase bronchial reactivity in asthmatics, decreased lung function in patients with chronic obstructive pulmonary disease and increased risk of respiratory infections, especially in young children. Generally, the risk of pollutants poses to a person's health depends on the concentration, the length of exposed, and the person's individual sensitivity. World Health Organization,[2005], Sadek et al., [2012].

At Site-1 Nitrogen dioxide content ranged from 19.2-25.8 $\mu\text{g}/\text{m}^3$ & averaged 22.73 $\mu\text{g}/\text{m}^3$ in the first year. During second year its range was 22.8 to 31.5 $\mu\text{g}/\text{m}^3$ and averaged 26.88 $\mu\text{g}/\text{m}^3$. The Total Average was 24.70 $\mu\text{g}/\text{m}^3$.

At Site-2 NO_x ranged from 23.7 to 28.6 $\mu\text{g}/\text{m}^3$ and averaged 26.57 $\mu\text{g}/\text{m}^3$ During second year its range was 26.9 – 33.30 $\mu\text{g}/\text{m}^3$ & averaged 30.11 $\mu\text{g}/\text{m}^3$. The Total Average was 28.34 $\mu\text{g}/\text{m}^3$ [Table No 1].

Table No 1: Range , Average & Total Average of NO_x at Site-1 & Site-2.

Site	Parameter	Year	Range	Annual Avrg	Total Avrg.
1 IDA NACHARAM	NO _x [$\mu\text{g}/\text{m}^3$]	I	19.2-25.8	22.73	24.70
		II	22.8-31.5	26.88	
2 ABIDS	NO _x [$\mu\text{g}/\text{m}^3$]	I	23.7-28.6	26.57	28.34
		II	26.9-33.30	30.11	

NO_x increased during the second year of study at Site-1 & Site-2.

At Site-1 the concentration of Nitrogen dioxide showed 24.05 $\mu\text{g}/\text{m}^3$ in Premonsoon, 21.52 $\mu\text{g}/\text{m}^3$ Monsoon and 22.62 $\mu\text{g}/\text{m}^3$ in Postmonsoon season during first year. During second year it showed seasonally 28.2, 26.97 & 24.87 $\mu\text{g}/\text{m}^3$ in Premonsoon, Monsoon & Postmonsoon. The Average values are 21.36, 24.24 & 23.74 $\mu\text{g}/\text{m}^3$. At Site-2 the concentration of Nitrogen dioxide was 27.85 $\mu\text{g}/\text{m}^3$ in Premonsoon, 25.15 $\mu\text{g}/\text{m}^3$ Monsoon & 26.72 $\mu\text{g}/\text{m}^3$ for Postmonsoon seasons during first year. During second year the seasonal variations were 29.65 $\mu\text{g}/\text{m}^3$ in Premonsoon, 30.02 $\mu\text{g}/\text{m}^3$, Monsoon and 30.67 $\mu\text{g}/\text{m}^3$ in Postmonsoon. The Average values are 28.75, 27.58 & 28.69 $\mu\text{g}/\text{m}^3$ [Table No :2]

Table No 2: Seasonal Averages of NO_x at Site-1 & Site-2

Site	Parameter	Year	Seasonal Averages		
			<i>Pre.Mon</i>	<i>Mon</i>	<i>Post.Mon</i>
1 IDA NACHARAM	NO _x [$\mu\text{g}/\text{m}^3$]	I	24.05	21.52	22.62
		II	28.2	26.97	24.87
		Avrg	21.36	24.24	23.74
2 ABIDS	NO _x [$\mu\text{g}/\text{m}^3$]	I	27.85	25.15	26.72
		II	29.65	30.02	30.67
		Avrg	28.75	27.58	28.69

The Atmospheric NO_x showed Positive correlation with Solar radiation, RSPM & TSPM with r values of 0.263, 0.053; 0.342, 0.121; 0.303, 0.308 respectively at Site-1 & Site-2. It showed negative correlation with Relative Humidity, Rainfall, Barometric pressure, & Wind Direction with r values of -0.044, -0.032 ; -0.032, -0.191 ; -0.485, -0.118 & -0.237, -0.350. [Table No: 3]

Table No 3: Correlation [r] between NO_x & Solar Radiation, RSPM, TSPM, Relative Humidity, Rainfall, Barometric Pressure, Wind Direction at Site-1 & Site-2.

S.No	Parameter	NO _x - Site 1	NO _x - Site 2
1	Solar Radiation	0.263	0.053
2	RSPM	0.342	0.121
3	TSPM	0.303	0.308

4	Relative Humidity	-0.044	-0.032
5	Rainfall	-0.032	-0.191
6	Barometric Pressure	-0.485	-0.118
7	Wind Direction	-0.237	-0.350

In Hyderabad City the amount of NO_x increased during the first year of study $3.85 \mu\text{g}/\text{m}^3$ for 1 year, for 10 years its rate will be $38.50 \mu\text{g}/\text{m}^3$ & for 50 years it will be $192.50 \mu\text{g}/\text{m}^3$.

Table No 4: Rate of accumulation of NO_x at Hyderabad City

Sl.No.	Time period	Nox
1	1 yr	$3.85 \mu\text{g}/\text{m}^3$
2	10 yrs	$38.50 \mu\text{g}/\text{m}^3$
3	50 yrs	$192.50 \mu\text{g}/\text{m}^3$

Conclusions:- Air Pollutant NO_x increased at Abids with a Total Average of $28.34 \mu\text{g}/\text{m}^3$ than IDA Nacharam $24.70 \mu\text{g}/\text{m}^3$.

* The **Rate of Accumulation** for NO_x was $3.85 \mu\text{g}/\text{m}^3$ for 1 year, for 10 years its rate will be $38.50 \mu\text{g}/\text{m}^3$ & for 50 years it will be $192.50 \mu\text{g}/\text{m}^3$. Unless steps are taken to control its emission **Photochemical smog** may occur in course of time parallellising the movement of all vehicles two wheelers, four wheelers etc in our city **Hyderabad** like **Los-Angeles**.

* At **Site-2 Abids**, since schools, residential areas are in its surroundings **Traffic diversion during school hours to protect the health of school children to prevent traffic jam**; Public Transport must be diverted 1 hour in Morning & 1 hour in Evening.

* Steps have to be taken to protect the health of Industrial workers, School children & general Public by providing **masks for nose & mouth**.

This study throws light on the quality of air so that proper initiative measures can be implemented. The **Air Quality** is **very important** to **protect the health** of the citizens residing in a particular City.

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