MEASUREMENT OF PM2.5 IN PLAIN AND HILLY

AREASIN TRAFFIC CONJUCTION PLACES

[1]Asokraj kumar,[2] Saravanan ,[3]Ramesh ,[4]Ranjith kumar ,[5]Ravi ,[6]Sathish kumar

[1] Proffessor, Department of Mechanical Engineering Gnanamani College of Technology, Namakkal Tamilnadu, India.

[2]Assistant Proffessor, Department of Mechanical Engineering Gnanamani College of Technology, Namakkal Tamilnadu, India.

[3,4,5,6]UG Students Department of Mechanical Engineering Gnanamani College of Technology, Namakkal Tamilnadu, India.

ABSTRACT

Particulate matter pollution is one of the major environmental concerns in India. Over the past 20 years there has been a considerable increase in the number of motor vehicles. The present study was conducted to assess journey time and roadside exposure to particulate matter along major roads of Plain and Hilly Areas in tamilnadu during February 2018.Measurements of particulate mass were carried out continuously outside the vehicle at 15 different locations in all three cities. Additionally, monitoring was undertaken at a background site throughout the period. The particulate matter (pm2.5) has analyzed by using pm 2.5 and test meter . It also measures humidity and temperature. The highest levels were found at the sites with traffic congestion reflecting, not only, the large contribution of automobile exhaust but also the resuspension of road dust. The majority of public transport vehicles in these cities are not air-conditioned and it is very likely that commuters are exposed to the similar high levels of pollution.

key words:*Alalysis,Polution,traffic conjuction places*

INTRODUCTION:

> ➢ The World Health Organization estimates that air pollution contributes to approximately 800,000 deaths and4.6 million lost life years annually . Developing nations are particularly affected by air pollution as many as two thirds of the deaths and lost life years associated with air pollution on a global scale occur in Asia.

> ➢ To date, estimates of the health effects resulting from exposure to air pollution in Asia have relied largely on the extrapolation of results from research conducted outside Asia primarily in Europe and North America . India need to generate regular information on the ambient concentration levels of small particulates of diameter less than 10 micron and/or 2.5micron and take urgent steps to control emissions of these particles.

> ➢ Recent reports suggest that India has extremely high levels of environmental pollution especially air pollution. India is the home to 13 of 20 top cities in air pollution. It is because India's air has a lot of particulate matter 2.5 (World Health Organization).

LITRATURE REVIEW

> ➢ **Pooja chauhan**: Environmental conservation became a major concern. Pollution is the major threat in most of regions in the world.

> ➢ India is also witnessing the environmental pollution due to rapid economic growth and insufficient implementation of environmental pollution control measures.

> ➢ Though the measurement of air quality is complicated, there are a few pollutants which regulators keep under supervision through regular monitoring.

> ➢ The most observed pollutants includes PM, NO2, SO2, CO2 etc. This paper aims to provide an overview of environmental pollution especially air pollution and concentration pollutants (PMs, SO2, NO2 etc.).

> ➢ **Sateesh. N. Hosamane:** Rapid economic growth has brought many benefits to India the environment has suffered, exposing the population serious air pollution.

> ➢ The consequences of pollution have led to poor urban air quality in many Indian cities. The air pollution and the resultant air quality can be attributed to emissions from transportation, industrial and domestic activities.

> ➢ The air quality has been, therefore, an issue of social concern in the backdrop of various developmental activities.

> ➢ Though the measurement of air quality is complicated, there are a few pollutants which regulators keep a watchful eye on through regular monitoring.

> ➢ **Zaheer Ahmad Nasir, Ian Colbeck:** Particulate matter pollution is one of the major environmental concerns in Pakistan. Over the past 20 years there has been a considerable increase in the number of motor vehicles.

> ➢ The present study was conducted to assess journey time and roadside exposure to particulate matter and carbon monoxide along major roads of Lahore during November, 2007.

> ➢ Measurements of particulate mass and carbon monoxide were carried out continuously inside an air conditioned vehicle, while commuting, and outside the vehicle at 36 different locations in the city. automobile exhaust but also the resuspension of road dust.

> ➢ The majority of public transport vehicles in Lahore are not air-conditioned and it is very likely that commuters are exposed to the similar high levels of pollution.

> ➢ **Gang Wang, Shuiyuan Cheng:** The measurement of PM2.5 was conducted from 15th August to 17th September, 2015 in Shijiazhuang, China, covering the period of a ceremonial parade.

> ➢ The PM2.5 concentrations and the major chemical components were analyzed. The concentrations of PM2.5 was 26.5 μg m–3 during control, which were 57.0% and 51.1% lower compared to before and after control, respectively.

> ➢ The lowest concentrations of elements and water-soluble ions were also found during control with a decreasing tread of 31.1%–44.2%, and 57.1%–64.2%, respectively.

> ➢ Two typical pollution episodes characterized by significantly elevated PM2.5 concentration were found during no control due to the combination of no emission-reduction measures and unfavorable weather conditions.

> **Shivanand Swamy:** There is a growing concern about the health impacts of transportation leading to curiosity among commuters about their exposure to air pollutants during transit.

> The paper examines a critical pollutant, Particulate Matter (PM2.5) and explores road based transport modes with an objective to minimize risk of exposure to pollutants.

> The study is conducted on a 10 km stretch in the city of Ahmedabad, India using Bus Rapid Transit System (BRTS) buses, city buses and other motorized and non-motorized modes.

> It defines variation in PM2.5 concentration levels while commuting in different modes, during various seasons (winter, summer and monsoon), location as well as varying time of the day.

Particulate Matter – Overview

> Can be liquid or solid particles.

> Usually defined in terms of PM_{10} and $PM_{2.5}$ where the subscript refers to the diameter of the particle in microns ≤ 10 or 2.5.

> Reduces visibility in the atmosphere and Causes health problems related to the respiratory system and circulatory systems.

Relative sizes of particles in air :

Image courtesy of EPA, Office of Research and Development
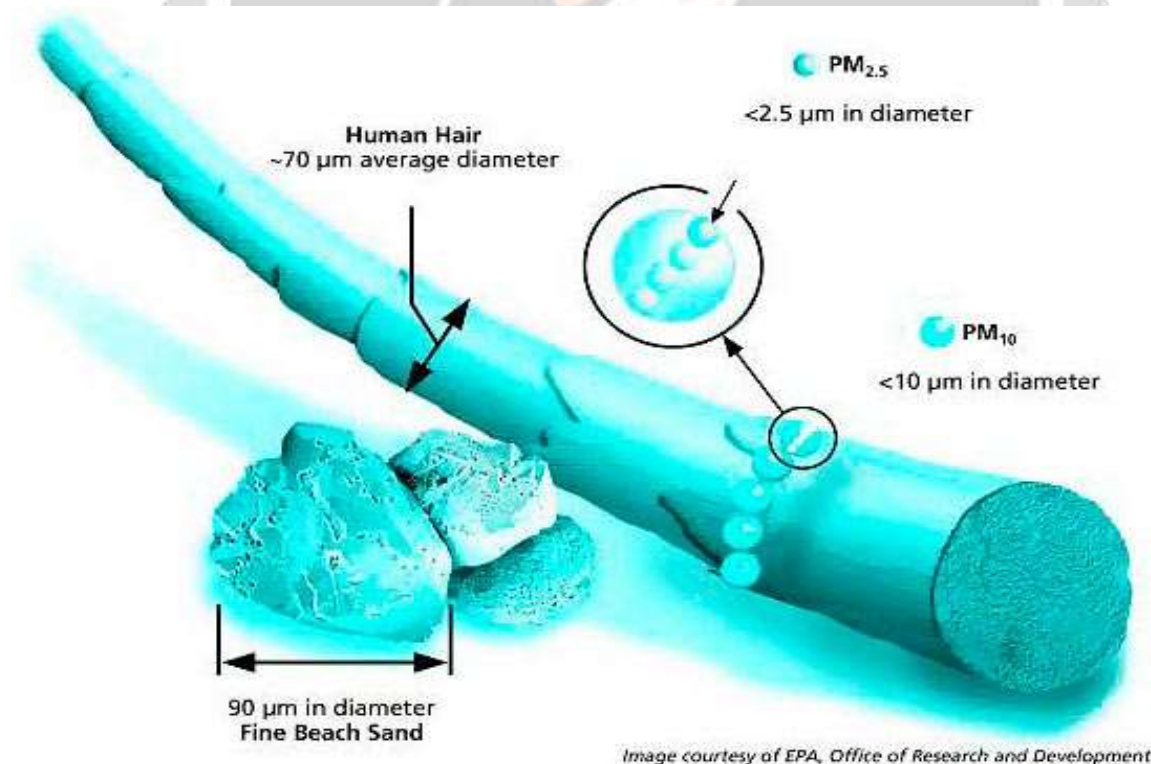
Relative sizes of particles in air
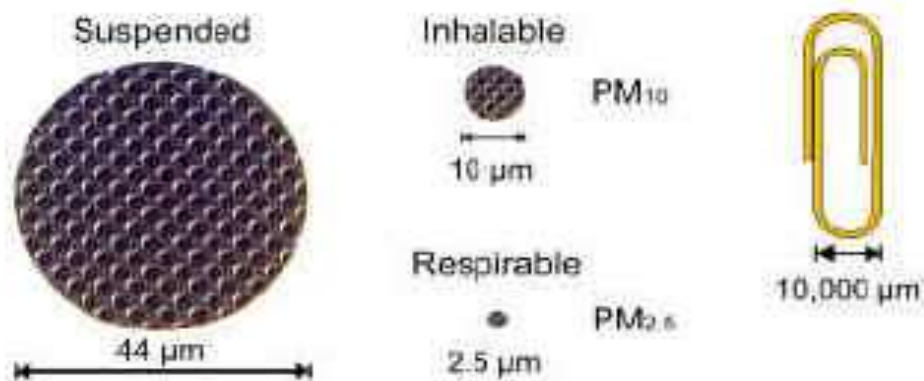
Particulate Matter Standards

➢ High-volume samplers measured PM by Total Suspended Particulate Matter (TSP). TSP usually less than 25-50 μg/m^3. Concentrations measured usually around 260 μg/m^3.

➢ Based on research in the 1960s and 1970s, the human respiratory system was found to be affected by PM that was finer than what high-volume samplers measured.

➢ A new standard based on PM$_{10}$ was established using a 24-hour concentration of 150 μg/m^3.

PM 2.5 TEST METER

PM 2.5 METER DESCRIPTION &FEATURES

- ➢ This electrical device measures indoor air quality pm2.5 dust particles concentration, humidity and temperature.
- ➢ Measures indoor air quality instantly with a real time manner.
- ➢ Shows pm2.5 concentration level in micro gm/cu.mtr.
- ➢ Pm 2.5 particle sensor used. Dust range from 12 to 35 pcs/cm3
- ➢ Accuracy of 75%over detection range.

READINGS   PLACE: NAMAKKAL

S.NO	TIME	AQI	TEMPERATURE	PARTICULATE MATTER CONCENTRATION	VEHICLEGROWTH				
					2W	3W	4W	MIS	TOTAL
1	10	86	30	11757	80	41	90	31	242
2	11	250	30	12233	91	60	84	40	275
3	12	105	30	12006	98	68	81	27	274
4	13	66	35	6396	45	34	31	30	140
5	14	63	35	6702	81	60	81	17	239
6	15	60	36	6024	74	31	18	45	168
7	16	63	32	5849	60	17	90	41	208

INFERENCE:

SUNNY DAY

READINGS: PLACE-KOLLIMALAI

S.NO	TIME	AQI	TEMPERATURE	PARTICULATE MATTER CONCENTRATION	VEHICLEGROWTH				
					2W	3W	4W	MIS	TOTAL
1	10	132	24	10773	30	4	7	2	43
2	11	121	24	11487	27	5	9	3	44
3	12	126	25	11607	31	4	12	5	52
4	13	120	26	12051	33	7	5	2	47
5	14	120	27	11471	21	9	11	17	58
6	15	122	26	11937	27	5	19	11	62
7	16	130	26	12972	18	11	23	9	61

INFERENCE:

PARTLY CLOUDY

GRAPHS**:**   Namakkal-Bus Stand

Particulate matter Vehicle growth Temperature Humidiy

GRAPHS   Kollimalai

particulate matter vehicle growth temperature humidity
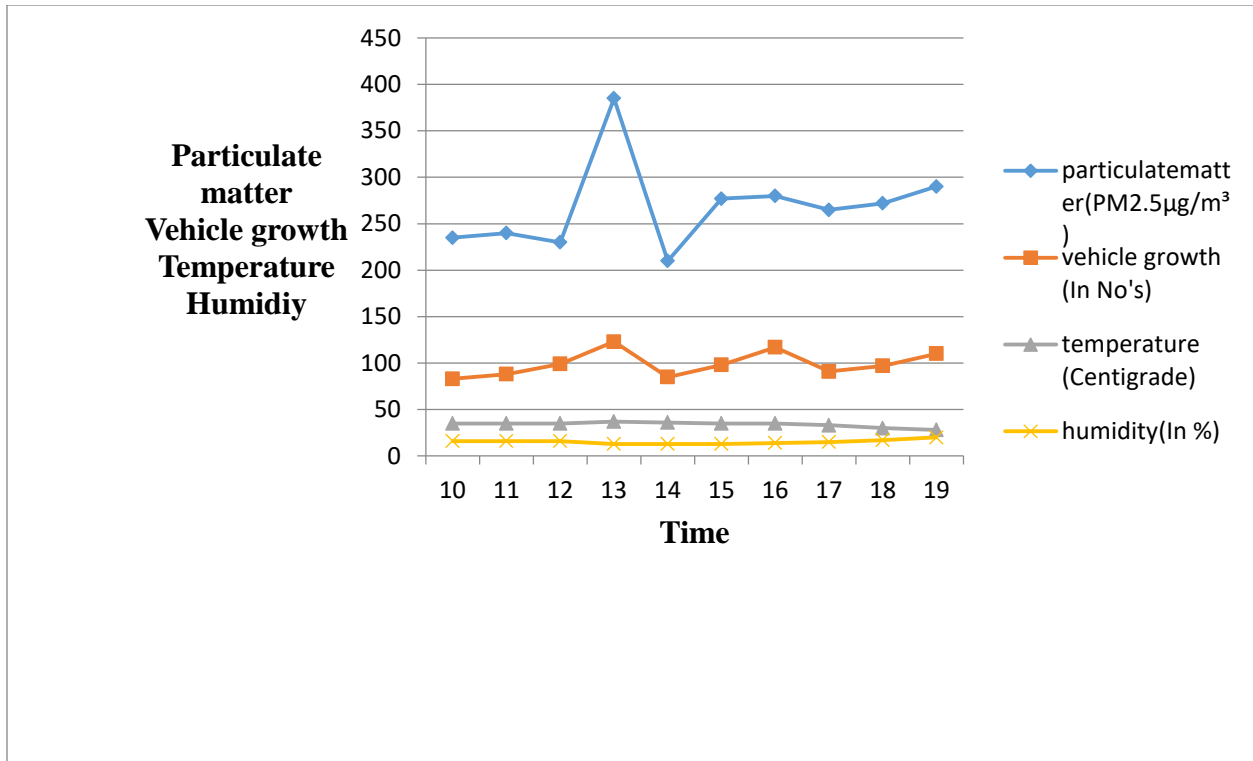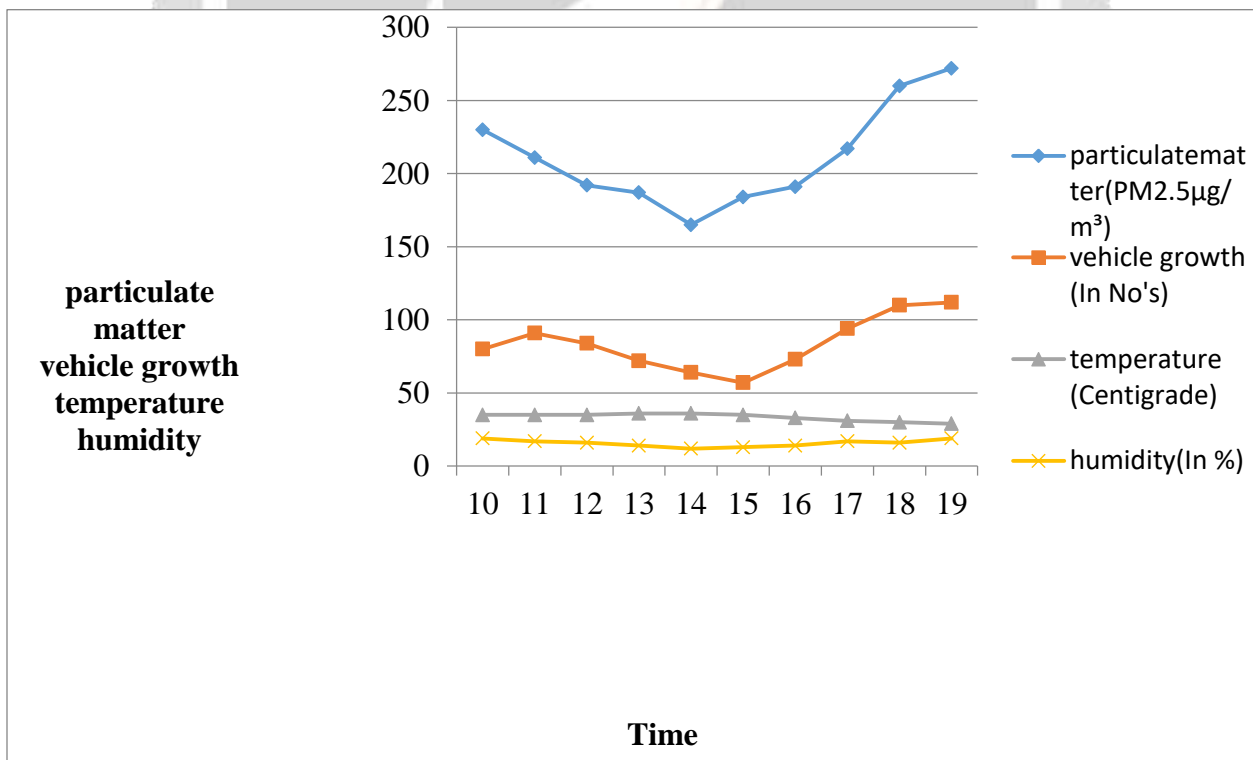
Key to air quality levels

AirQualityIndex Levels of Health Concern	Numerical Value	Meaning
Good	0 to 50	Air quality is considered satisfactory, and air pollution poses little or no risk
Moderate	51 to 100	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
Unhealthy	151 to 200	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.
Very Unhealthy	201 to 300	Health alert: everyone may experience more serious health effects
Hazardous	301 to 500	Health warnings of emergency conditions. The entire population is more likely to be affected.

Sources of PM

 ➢   wood burning stoves and fireplaces

 ➢   dust from construction, landfills, and agriculture, mining

 ➢   wildfires and brush/waste burning

 ➢   industrial sources

 ➢   windblown dust from open lands

HEALTH EFFECTS:

- ➢ Aggravates conditions such as asthma, bronchitis, emphysema.

- ➢ Can trigger asthma attacks.

- ➢ Makes it difficult to breathe.

- ➢ Can cause premature death in elderly people or people with heart disease and respiratory diseases .

- ➢ Can cause future health problems in children (such as asthma, increased illness).

EFFECTS ON VISIBILITY:

- ➢ Most haze is not natural, it is caused by air pollution.

- ➢ Air pollution, especially particulate matter, scatters and absorbs light.

- ➢ Sulfates particles are very effective in scattering light, especially in humid conditions.

CONCLUSION

- ✓ While recognizing that PM2.5 contamination was an issue, no Indian organization has evaluated demise and infection because of air contamination in India. The main controlling factor is particulate matter and vehicle movements.

- ✓ In Salem five roads surroundings is the worst place for accumulating dust by traffic congestion to compare with hilly areas.

- ✓ In general the humidity increase or decrease based on the temperature decrease or increase which influences the quantum of particulate matter decreases when humidity increases, and at the sometime rain without wind also shows decrease PM 2.5.

REFERENCE:

1) Saptial and temporal patterns of air pollutants in rural and urban areas of india-**Disha Sharma ,U.C.Kulshrestha**
2) Background air pollution studies in urban and rural areas - **A.H.Khan**
3) Establishing integrated rural and urban cohorts to assess air pollution-**Kalpana Balakrishnan**