

**INTERNATIONAL JOURNAL OF ADVANCES IN PHARMACY,
BIOLOGY AND CHEMISTRY****Review Article****Air pollution by automobiles of Existing situation in
Mysore city****Harish M**Transport Planner Centre for infrastructure, Sustainable Transportation and Urban Planning,
Indian Institute of Science, Bangalore, Karnataka, India.**ABSTRACT**

One of the important challenges is the increase of vehicles and emitting the unwanted smoke to the environment which harms the environment of urban areas. The increase in vehicle leads to changing the landscape with important atmospheric consequences. The study is based on the vehicle population which consist of 4, 38,003 (31st March 2011) (estimated and Projected) in Mysore city. The main objective of the study is to find the emissions from the vehicles and their impact on the environment and health. While, Asian cities is facing environmental problems from the automobile Pollution. This will provide estimates for the emissions from vehicles /gms/per kilometer in a day. It also estimates the relative contribution from different vehicle type of transport system and services in Mysore city. This will finally focus on the attempt and effects due to increase in the vehicle ratio, emissions and to reduce emissions in corporation limits So for this, the data regarding the number of registered vehicles, emissions standard from Central Pollution Control Board, Karnataka State pollution Control Board, transport department , Government of Karnataka, has been collected and used.

INTRODUCTION

One of the great problems faced during end of 20th century is increase in vehicles due to economic development and damaging environment with the air pollution by vehicles. But in urban areas both developing and developed countries, it is predominately mobile and vehicular pollution that contributes to air quality problem. The quality of air has become so poor in Mysore is the result of both high emissions from vehicles and unfavorable conditions such as stagnation and inversions, which tend to restrict dispersion of pollutants, emitted into atmosphere. The source of pollutants includes emissions from combustion of fossil fuels in motor vehicles and industrial processes and high dust levels due to local construction, smoking, unpaved roads and long-range transport from surrounding barren landscapes.

The policy initiatives to address these problems effectively are urgently needed. So the paper deals with the study of air pollution caused by the automobiles in Mysore.

This will make an attempt to study on air pollution (CO, NO_x, PM 2.5, PM10, RSPM, HC, etc.) in Mysore and the types of vehicles emit them. The present day environment crisis demands a change in attitude in order that initiatives can be taken to

rescue environment from destruction from air pollution

The worst thing about vehicular pollution is that it cannot be avoided as vehicular emissions are emitted at near-ground level where we breathe. Some of the cities have faced the air and water pollution problem in Mexico, Begoang, and New Delhi etc. The Mysore is one of the cities having 4.1 lacks of vehicles in the city. The automobile with poor environmental quality continues to grow in multiple ratios. There is an urgent need to address interrelated problems and obstacles experienced by them in urban areas of the world and a need for a more complete understanding of the connections between air pollution.

The Problem

The air pollution levels are often centered in urban areas, the impacts of urban activities are not confined within the city boundaries, while regional and global dispersion of air pollutants generated locally well be established in the case of acid deposition, climate change and stratospheric ozone depletion. The concerns for tropospheric ozone and particulate matter have heightened recently because long-range transport of these pollutants could influence air quality in regions far from their sources and because they also contribute to climate

change. Furthermore, land use and land cover are changing rapidly all over the urban centers around the world. While, increasing human population growth and human demands changes the landscape with important atmospheric consequences. Thus, rapid population growth, uncontrolled urban expansion, unsustainable economic growth, increased energy consumption and increased motorization all translate into serious air pollution problems in cities throughout the world. The air pollution does more than choke lungs, impair visibility and damage the ecosystems; it also poses a tremendous economic and social cost to society.

Objectives

1. To identify the types and source of air pollution.
2. To know the content of emissions from the vehicles.
3. To control the emissions from automobiles and reducing it.

The Study Area

The Mysore has a rapid development in urban area in demography, migration, transportation, or industrial sector. The Mysore will be the second metropolitan city in Karnataka in which it has 10,48,510 (projected) lacks of population as per 2011 census and 43 villages will be amalgamated to corporation. The intensity, quantity, and frequency of either urban, suburban and movement with other cities are the same factor of increasing transportation problem in Mysore city; especially in transportation utility development ply with demand. The dependency of urban population on transportation systems on fossil fuels is quite high due to increase by private vehicles.

The traffic congestion contributes greater to deteriorating environment in urban communities. In the last few years, about 70% of ambient-air quality degradation in Mysore is affected by transportation activities.

Based on Statistics of department of road transport offices (RTO) in Mysore (2011) the increasing of motor vehicle in Mysore has gone to 4, 38,003 (31st March 2011) (estimated and Projected) till this year. While transportation activities could effect on positive impact like the increasing economic activity, or negative impact on increasing of street capacity could effect in decreasing ambient air quality and also decreasing on public health quality.

Methodology and Review of Literature

Moreover, these situations are causing derived effect of environmental based on the studies conducted by various institutes and organizations. Aditama (1999) has been predicted that around 60%–80% of urban populations around the world are living in bad air quality that is some pollutants

are almost same over to national ambient air quality standard. Based on Indonesian Environmental Status Report (2002), most of air pollution (70%) in big cities in Indonesia comes from transportation activities, and other 30% comes from industrial activity and human settlement. A study by SOEHODHO and TAUFICK (2005) based on “A study based on Correlation and motor Vehicles Emission”. Their observation denotes that air pollution concentrates on few respiratory disease cases show similar problems. Goyal (2004) has studied “Air Quality Management of particulate Matter Emitted from Vehicular sources from Delhi” has come to a conclusion that the permutable air suspended particles is more compared to national policy and to install emission test and air quality management, centers in Delhi. MarinoJ Molina and Luisa T Molina of Massachusetts Institute of Technology in their study based on “Improving Air quality in Mega Cities –Mexico city a case study” recommends that it is necessary to have active and informed participation of society, private sector, academic community, social organizations, and Government. Since dealing with pollution requires the implementation of different specific strategies in multiple fields of action

The growing problems related to traffic are congestion, accidents, and lacks of security are also very worrisome. The key question, therefore, is how to reduce the adverse environmental impacts and other negative effects of transportation without giving up the benefits of transportation.

Due to weak in planning, land use controls, low-income housing is constructed in locations which lack adequate road capacity and mass transportation options, and new commercial development occurs with inadequate roadway and transit access.

Air Pollution from automobiles

Automobile pollution arises due to combustion of fossil fuel with air inside the cylinder of the vehicle. Exhaust waste gases cause the pollution when individual exhaust gases exceed their limits Air pollution is a worldwide problem in this century by leaving the harmful substances into environment which can occur naturally or artificially. There are more automobiles on the road today are because of this we experience higher levels of pollution than before. The automobile is probably the leading contributor pollution in our cities. Transportation is a major source for the economic activity and redistribution of resources. Air pollution is a dangerous threat caused by many different sources exhaust from automobiles, Nitrogen Oxides (NO, NO₂, O₃)P M₁₀ and Sulpher Dioxide (SO₂). But transportation sector is a major source of air pollution in Mysore.

The growing problems of air pollution, congestion, accidents, and lack of security due to automobiles are worrisome.

These black gases produced by unfiltered automobiles exhaust may cause many health problems such as asthma or in extreme cases, could eventually lead to difficulty in breathing. It also affects children mostly by making them handicapped as it affects young people brains. Finally, the causes of air pollution can be many to name, but many of them can be reduced by human beings by reducing the activities which produce these harmful and hazardous gases as: exhaust, Nitrogen oxides and Sulphur dioxide

The Karnataka State Pollution Control Board (KSPCB, Mysore) conducts the monitoring of ambient air in city every month for 24 hours twice a week. There are two conventional ambient air quality monitoring centers in Mysore — one located at K.R.Circle and the other at Hebbal, and Nanjanagud an industrial area. The K.R. Circle unit measures the pollution level caused by vehicular traffic while the one at Hebbal measures residential pollution and the Kallahalli near Nanjangud (next to M/s Jubilent Organosys) measure the pollution of Industrial region.

As the population has increased and the residential areas have decentralized, patterns of passenger trip mode choice in Mysore have also shifted dramatically: The number of private automobiles has increased significantly, due to decentralization, globalization, standardization by most estimates at a rate of 18 percent annually in recent years. This could mean a higher number of vehicles in Mysore, a higher ratio of vehicles per persons, and the possibility that the trips and the distances traveled will increase even more as a result of the escalation of economic and social activities.

With the increasing urbanization, the complexity of the problems has multiplied in Mysore. With a

population of 10, 48,510 according to 2011 census (projected) and ever increasing rural and urban migration, the city's infrastructure is beginning to take its toll. Population growth leads to an increase in demand for public transport. But due to the limited availability of such services, there in an average increase in the number of private vehicles in the city. The economic activity has increased, which has the purchasing power enhanced by consumerism among the citizens. The vehicle population presently stands at 4, 38,003 (31st March 2011). The motorized vehicles in the city have been increasing day-to-day.

Therefore to reduce the adverse environmental impacts and other negative effects of transportation without giving up the benefits of mobility. As the increasing geographic dispersion of Mysore population is also likely to increase aggregate transportation demand, since the greater number of trips will also be longer and public transport will be less efficient and universal.

The data shows the number of registered and share of different modes of vehicles in Mysore city for the year 2011.the emissions from road is based upon the number of vehicles and distance travelled in a based on vehicle type. The assumption has made based on the articles on distance travelled. One such study is conducted by Singh 2006 states that annual utilization of vehicles such as buses, omni buses, 2 wheelers, light motor vehicles, cars and jeeps and taxi were assumed to run 100 000,100 000, 6300, 33 500, 12, 600 and 12 600 km respectively (buses, 2 wheelers, car and auto rickshaw) . There are similar works are carried out by the Ministry of petroleum, Ministry of highways etc. The emission from the vehicles and the distance travelled is shown in the table below.

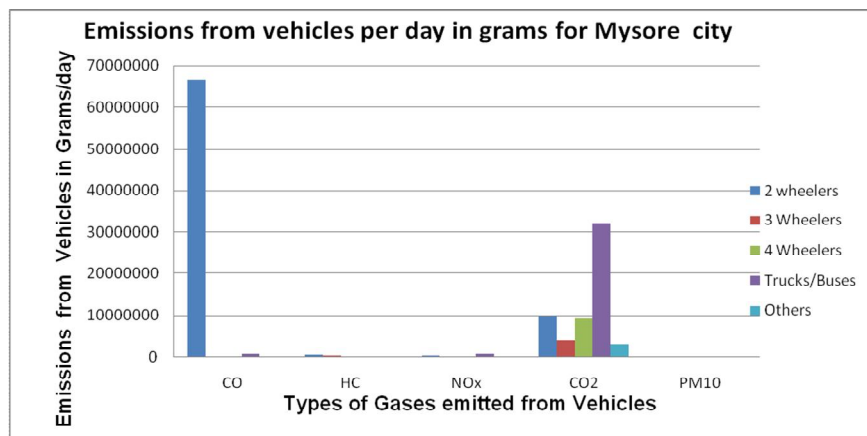
Table 1: Vehicle travelled in a day and their emissions in 2010

Type of Vehicles	Total Number of Vehicles and the distance travelled		Emissions from vehicles gms /Kms in Year 2010				
			CO	HC	NOx	CO2	PM10
2 wheelers	351074	351074x12=4212888 Km	665636304	3117537.12	1263866.4	97949646.03	63193.32
3 Wheelers	17155	17155x35=600425 Km	822582.25	1338947.75	120085.0	37472524.25	270191.25
4 Wheelers	49180	49180x12= 590160 Km	177048.0	153441.6	289178.4	91215129.6	35409.6
Trucks/Buses	9223	9223x52= 479596 Km	5822295.44	187042.44	5515354.0	320370128.0	381278.82
Others	8709	8709x10= 87090 Km	261270.0	111475.2	215983.2	29027967.4	57043.95
Total			13739558.73	4908445.91	7404467.0	576035395.7	807116.94

Source of Data: i. Regional transport Offices, Mysore, Types and Number of Vehicles.

ii. Emissions from vehicles: Status of the vehicular pollution control Program in India/PROBES/136/2010/CPCB,

iii. http://cpcb.nic.in/upload/NewItems/NewItem_157_VPC_REPORT.pdf



The following table indicates registered vehicles in Mysore city. This data reveals that city has a maximum strength of 2 wheelers have been registered and they run for 12Kms a day covering for about 4212888 Kms a day. By this vehicles will release maximum CO₂ more (6656363.04 gms) than HC (3117537.12 gms), NO_x(1263866.4 gms) CO₂ and PM₁₀ (63193.32 gms) as per 2010. The wheelers consists of 438003 in 2010 in the city of Mysore, these 3 wheelers consists of petrol, Diesel and LPG kits. At present the population of these vehicles shows 17155 to 2010, CO₂ more (822582.25) than HC (338947.75), NO_x(120085.0), CO₂ (37472524.25) and PM₁₀ (270191.25) as per 2010. The majority is petrol run vehicles whereas, the goods carrier are diesel run vehicles.

At present the 4 wheelers have petrol, diesel and Gas driven vehicles, these vehicles consists of Jeep, car, ambulances, cab, sumo etc. This has shown a drastic increase in the number of vehicles in this decade, The total number of vehicles in city is of 49180, while they have imagined that they run for about 12 kms a day and total covers of about 590160 kms a day and releasing, CO₂ more (177048.0) than HC (153441.6), NO_x (289178.4), CO₂ (91215129.6) and PM₁₀ (35409.6) in the year 2010.

The trucks /Buses had, the limited in number, but it is very important means of transport for the public and the free flow of goods. The bus and trucks emit the same emissions, but the distance travelled is more compared to other transport as because of the MCTC or CBS will generate trip for the commuters from 4.45 am in the morning to 11.30 in the night. These vehicles run on diesel only as there is no alternative fuel for these vehicles. The public transport can be converted to CNG kits but the trucks cannot run on gas due to carrying capacity. But the trucks transports essential daily requirements, building constructions, industrial requirements etc. So based on this the total number of vehicles is 9223 and commutes about 52 kms

makes a total of 479596 kms a day and it emits these for the year 2010 CO₂ more (5822295.44) than HC (187042.44), NO_x (5515354.00), CO₂ (320370128.0) and PM₁₀ (381278.82) in the year 2010.

The classification of other vehicles has showed in a small number, because the government has sub classified and moved the passenger of 10 person vehicles in to 4 wheelers, such as cabs, ambulances and some of the goods carrier etc. The majority of the vehicle is diesel driven vehicles, apart from this the others include earthing, farm machines, concrete mixture, bulldozers, road rollers and few imported vehicles. This showed 8709 in number and if may move about 10 kms and totaling distance travelled will be of 87090. The emissions for 2010 CO₂ more (261270.00) than HC (111475.5), NO_x (215983.2), CO₂ (29027967.4) and PM₁₀ (57043.95) is will be trend (9223) as an increase to 159.43 percent, but the projected data shows that there may be slightly increase trend to 266.00 percent and the number stands at 18704.

But the emission shows by an increase in 66.13 percent. Even the projected data for 2020 shows that there will be marginal increase to 135.56 and the number may be 24324. But the 4 wheelers have shown an increasing trend which will occupy more or roads and leads to congestion in traffic. The trend shows that the 4 wheelers has increased from 2000 (17483) to 2010 (49180) by a decadal growth by 181.30 percent. The projected details show that it may increase by 228.72 percent may be 57471 vehicles in 2020. The trucks /Buses had, the limited economy during that time in 2000 (3555) it showed a increasing trend, because the government has sub classified and moved the passenger of 10 person vehicles in to 4 wheelers, such as cabs etc. This has showed a trend (9223) as an increase to 159.43 percent, but the projected data shows that there may be slightly increase trend to 266.00 percent and the number stands at 18704. The other vehicle which form a small in number such as imported

vehicles, ambulance, earth movers, road rollers, concrete mixture machines etc, were reclassified and moved to other class, such as ambulance, cabs and taxis moved to 4 wheelers, mini buses to heavy motor vehicles, goods carrier and goods auto to truck classification. But the data shows that there was a trend in increase in other vehicles from 2000 (8709), but in 2010 it showed a decrease in trend by -95.74. The projected data for 2020 also shows a decreasing trend by (371) -80.99 percent and the number of vehicle would be 1055 in 2012 by (-2.28). The Mysore nearly has 4, 38,003 vehicles at present and it is increasing at the rate of 11,000 vehicles per year causing severe problems on the roads.

Findings from the study

Pollution from 2-wheelers

Two-wheelers account for about 72 percent of the total vehicular population in Mysore. Because of inherent drawbacks in the design of 2- stroke engines, 2-wheelers emit about 20-40% of the fuel un-burnt/partially burnt. Presently, two-wheelers account for more than 65% of the hydrocarbons and nearly 50% of the carbon monoxide in Mysore. As these emissions are less visible, the general public is not aware of the role of 2-wheelers in the deteriorating air quality in the city. The 2-stroke engine, in spite of R&D efforts towards improving its design, will continue to be a high emitter of hydrocarbons and carbon monoxide. While the absence of a technological breakthrough on the conventional 2-stroke engine and its high pollution potential, it is for consideration that Government considers the phasing out of two-stroke two and three wheelers. In future vehicle-based emissions testing should be conducted for at least once in three months in to gain a more accurate picture of the emissions that Occur from the specific vehicles in this city.

Pollution from 3-wheelers

Of the 17155 three-wheelers in Mysore nearly 0.5 percent of the total population of vehicles, they are petrol-driven, powered by 2-stroke engines. These vehicles are also high emitters of carbon monoxide and hydrocarbons. A pollution check conducted by Regional Transport Department has revealed that in some instances the levels are so high that they go beyond the measurable scale of test instruments. In addition, it is widely believed that petrol is adulterated with kerosene which results in emissions of thick black smoke.

Pollution from 4-wheelers

The Mysore city is having 49180 vehicles on the roads (Jeep, Taxi and Cars) as it consists of both petrol and diesel driven vehicles. It excludes the floating vehicles in the city area. These vehicles are also high emitters of carbon monoxide and

hydrocarbons which pollutes the air. These consist of old as well as new vehicles in the city. The city is having 18 percent of 4 wheelers which occupies maximum space on the road, it is one of the air pollutants in the city. it is widely believed that petrol is adulterated with kerosene which results in emissions of thick black smoke.

Pollution from MCTC and other privately operated buses

There are about 1223 privately operated state owned buses of city transport Corporation and trucks consist of 1.59 percent of the total population. About two thirds of the state owned buses fleet is beyond the recommended age of 4-5 years, some even beyond 8-10 years. Most of these buses require phasing out as their condition is beyond normal maintenance measures. Their continued use has resulted in emissions of very high levels of smoke and particulates from this the KSRTC, NWKSRTC and NEKSRTC, other State owned buses, and the private and industrial busses. If such vehicles continue to function beyond the recommended age and carry more than the permitted load of passengers and the goods by trucks.

Overloading at peak hours

The buses, particularly during peak hours, carry more than the recommended load of passengers. These buses will stops near the junctions and signal lights due to congestion of vehicles. This results in higher smoke emissions during the peak hours. While high capacity buses require to be inducted for carrying more passengers. The worst polluters should be taken off the heavy traffic corridors and high density areas. Similarly, for trucks, enforcement of laws related to overloading requires to be enforced vigorously to state owned buses etc.

Pollution from diesel trucks

The diesel trucks consists of 3 percent in population, similar to buses, emit high levels of smoke and particulate matter. An age limit needs to be specified for all commercial diesel trucks 15 years but still it had remained in the paper. But still so many MCC, CHESCOM and other Government vehicles is running on the streets. Renewal of permits must be done only if the vehicle conforms to satisfactory inspection and maintenance measures for pollution control for the state owned and private buses.

Impact of air Pollution on Health

Human health is the major concern over air pollution in the urban areas. However, the Mysore City Study considers effects of air pollution in and its impact on ecosystems, and with the linkage with global warming. The Mysore city like other

countries in the world contributes to global warming and is likely to be affected by it. Meanwhile, even though the percentage of total trips made by buses has increased due to adding of new luxury buses for transport systems, e.g., private vehicles competing for patronage on the same routes, frequently under conditions of cut-throat competition and limited regulation. The percentage of total trips has also increased, despite increases in system capacity and substantial government subsidies.

CONCLUSION AND RECOMMENDATIONS

The future research should focus on the role of vehicle pollution in Mysore city. This research has focused on air quality in Mysore to which by vehicle passengers and open or vehicle non-motorized vehicles (bicycle, 2Wheeler and so on) passengers and pedestrians will be exposed.

Green /Fossil fuel switching

The paper aims for switching of fossil fuel to natural gas or renewable biomass energy has important bearing on the environmental aspect of sustainability in Mysore city. All the three wheelers have been converted into gas kits and the few state owned buses are running in Bio-fuel resources. However, their impact on the poverty alleviation component is hardly discernible, particularly in case of substitution from naphtha, diesel or other fossil fuels to natural gas and bio fuels. It does not much impact on human health .All the public vehicles should be make use bio energy.

Reducing the use of diesel vehicles

The extent of the reduction of air pollution depends on the base case conditions put by the pollution control board, RTO, Traffic police etc, for the composition of the diesel vehicles in the city. The implementation in 2005 of bio-Fuel and Vehicle EURO limits together can achieve very substantial PM₁₀ and NO_x emission reductions in 2010 and 2020 by automobiles by adopting; automotive technology (EURO II to IV) has a major impact on NO_x and PM₁₀ Emissions with 45% to 65% reduction potential.

Increase in the economic condition

The changing economic conditions will result in welcomed increased standards of living and the use of increase in fossil fuel. This study however encourage to be a part of the effort underway and to develop the database in these cities that can be used to help local authorities set regulations that can protect or lessen the burden of chronic cardiopulmonary diseases.

Better quality fuels

Fuel quality standards for petrol and diesel have been notified under the Environment (Protection)

Act of the Central Government. The quality standards are being implemented by the Ministry of Petroleum & Natural Gas (MoP&NG) through the oil companies. The MoP&NG has introduced low-sulphur diesel (0.25%) recently within the city limits which would be further extended. Considering the serious nature of air pollution problem due to particulates which are emitted mainly from diesel vehicles, it is necessary that diesel with even lower sulphur content is introduced

Fuel Quality monitoring and surveillance

The state or the central government has to take the initiative steps for the establishing the calibration laboratories for fuel surveillance in Bangalore/ Mysore with different directions petro chemical engineering's, chemists, bio-fuel experts, lab technicians high tech lab. By this they can check alteration of fossil fuels in the city and to update on line Air Quality & Stack Monitoring data.

Implementation of EURO Standards

As per the standard the central pollution control board, (CPRD) has implemented to use EUROIII/ Bharat stage IV for vehicles. This is to check and reduce the emission and fuel quality norms on air environment and load reduction.

Inspection and Maintenance Program for Vehicles

The present system of checking pollution is only a representative method. A more effective system will be through the setting up of automated testing stations. The system can begin with testing of commercial vehicles and public transport vehicles to be linked with renewal of permits and registration.

Emission norms

Emission norms for all categories of petrol and diesel vehicles at the manufacturing stage were introduced for the first time in 1990, and made tighter in 1996. Stricter emission norms, already notified, will come into effect from 1.4.2000. At least once in a year the test should be conducted and the staff has to check along other documents.

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