

RESEARCH PAPER:

A correlation of suspended particulate matter with lead concentration in ambient air at different traffic junction of Madurai city

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SUMMARY

Rise in population, urbanization, tourist activity and expansion of the Madurai region has resulted in the considerable increase of vehicular traffic. This problem particularly manifests itself around the commercial and bus station. Particulate matter and lead monitoring was conducted in an urban area of Madurai in a state of Tamil Nadu. Statistical analysis of particulate matter and lead metal concentration in the air of Madurai city was performed. Three sites namely, industrial, traffic and residential area based on the activities were selected to determine the variation in the concentration levels. The study focuses the key air pollution problem arising from vehicular pollution. The significant differences were observed between all the concentrations of pollutants and at all three sites. The correlation study of Suspended Particulate Matter with lead have been established. The average concentration of suspended particulate matter and lead in ambient air was found $217.5 \mu\text{g}/\text{m}^3$ and $0.38 \mu\text{g}/\text{m}^3$ which ranged 130.8 to 286.8 and 0.11 – 0.69 $\mu\text{g}/\text{m}^3$, respectively. The correlation of suspended particulate matter and lead ($r = +0.605$, and $R^2 = 0.366$) was found to be significantly and positively correlated.

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SPM, Vehicular pollution, Lead, Air pollution, Correlation

The urban population is exposed to higher levels of suspended particulate matter and lead metal due to urbanization and industrialization. Concentration of ambient air particulates has been found to be associated with a wide range of effects on human health (Dockery and Pope, 1994; Schwartz, 1991; Schwartz, 1994; Zmirou *et al.*, 1998). Approximately fifty thousand premature deaths occur annually due to particulate matter pollution in India (Brandon and Hommann, 1995).

The high concentration of particulate matter in the environment has become a problem for many countries (Elbir *et al.*, 2000). Air pollution has been aggravated by development that typically occurs as countries become industrialized: growing cities, increasing traffic, rapid economic development, industrialization and higher levels of energy consumption. The high influx of population to urban areas increase in consumption patterns and unplanned urban and industrial development have led to the problem of air pollution currently in India. Air pollution is widespread in urban areas where vehicles are the major contributors and in a few

other areas with a high concentration of industries and thermal power plants. Vehicular emissions are of particular concern since these are ground level sources and thus have the maximum impact on the general population. Also, vehicles contribute significantly to the total air pollution load in many urban areas. The rate of increase of pollutant concentration in the developing countries like India are higher than those of developed countries and hence atmospheric pollution is often severe in cities of developing countries all over the world. The exhaust gas from automobile is one such significant source. There have been many investigations in recent years relating to the distribution and accumulation of lead emanating from automobile exhaust.

The objective of the present investigation is to determine suspended particulate matter (SPM) and lead present in the atmosphere. The lead burden of environment is related to vehicular traffic. Singer and Hanson (1960) and Page and Ganji (1970) found that the lead level in the atmosphere increases with increase in traffic density. In light of the above, the

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