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Study of Effect of Lockdown during Pandemic of COVID-19 on Percentage of Lead in Environmental Samples of Bhandara District

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Abstract: *Increasing urbanization, industrialization and over population is one of the leading causes of Environmental degradation and pollution. Heavy metals (HMs) such as Pb, Zn, Cd, As etc. are one of the most toxic pollutants which shows hazardous effects on all living creators. Lead is one such pollutant which disrupts the flora and fauna found to be lethal even at low concentration. Even emission of heavy metals from traffic activities is an important pollution source to road side farm kind or forest area ecosystems. During the lockdown of pandemic there was tremendous decrease traffic activity on highways of Bhandara district. In this study, investigation was carried out on influence of transportation activities on lead percentage in environment taking plant leaves samples from various locations on highway and state highway passes through Bhandara district. During lockdown period and recently after unlock period in the month of July leaf samples collected along roadsides from prominent spot on national and state highways. Percentage of lead was determined by using diphenylthiocarbazone (Dithizone) colorimetrically. The Double beam spectrophotometer was used to determine the percentage of lead in leaf samples. The results shows that the concentration of lead in the roadside leaves was found to be much lower during lockdown period while it is much higher in plant leaves after unlock period due to tremendous increase in traffic activities on highways specially NH-06 passing through Bhandara. The use of leaded gasoline is thought to be responsible for the high concentration of lead in the roadside leaves of plant.*

Keywords: Lead, Colorimetric, Dithizone, traffic activity, Bhandara district

I. INTRODUCTION

Lead is a natural constituent of the environment and most of the naturally occurring lead is found in the soil. Lead is related to the atmosphere from both natural and manmade sources. Natural sources mostly from windblown dust and volcanoes are relatively small compared to manmade source (UNEP and WHO, 1988). The present study reported that the present concern is on lead entitled to the environment by the use of lead-alkyl antiknock compounds in gasoline. Also, petrol consumption globally contributes as estimated 60 % of the total lead emission from human activities. Lead is a non essential element for man and has toxic potential for all biological system. The major source of lead in man is the food chain plants, animals and ultimately man receives most of their lead from that naturally present in environment [1].

In this study investigation was carried out an influence of transportation activities on lead percentage in environment, collecting plant leafs samples from various locations on highway and state highways passes through Bhandara district. During lockdown i. e. after March 2020 and recently after unlock period in the month of July leaf samples collected along roadsides from prominent spots on National and State Highways. The percentage of lead was determined by using diphenylthiocarbazone calorimetrically. The instrumental methods are preferable because they are rapid and do

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not require extensive separations. The selectivity of the dithizone extraction process can be improved by choice of suitable pH and use of masking agent such as EDTA etc. [2-10].

II. Materials and Methods

Bhandara district, Maharashtra state (M. S.) i. e. between 21° 10′ and 80° 0″ E. It is situated in the river basis of Waingangā River and its tributaries. Total area is 9280 square kilometres of which 3192.44 Sq. Km is forest area. A leaf samples collected along roadsides from the prominent spot on Natural highways and State highways. Samples collected from Kharati, Shahapur, Bhandara, Godegaon, Lakhani, Pimpalgaon, Mohadi, Tumsar, Adyal and Pauni leaf samples were over dried at 120 °C, pulverized to uniform size with laboratory mortar and ashed in a muffle furnace at 50 °C – 60 °C for 3 hour. The ash was cooled and 1 g of it digested with 10 cm3 of 50 % hydrochloric acid, filtered and made up to 50m3 with deionised water. All digested samples were stored in washed, dried polyethylene sample bottles. The digested samples were analysed using dithizone colorimetric method (Basett, 1978, Christian, 1977) with Double Beam UV-Visible Spectrophotometer at a wavelength 540 nm.

III. Results and Discussions

Though the use of unleaded gasoline has caused subsequent reductions in fuel emission of Pb, it may still occur in exhaust gases and come from warm metal alloys in the engine. Heavy metals can be transported into leaves by gases or winds. The detailed results of lead concentrations in the samples obtained from different sites during lockdown and unlock period are presented in table 1.

Table 1: Lead concentrations (ppm) determined by dithizone calorimetrically method.

Sr. No.	Place	Type of sample	Lead concentration During lockdown	Lead concentration During Unlock
1	Khrashi (NH)	Leaf	65.9	80.8
2	Shahapur (NH)	Leaf	60	89.7
3	Bhandara (NH)	Leaf	68.2	79.6
4	Gadegaon (NH)	Leaf	70.5	89.6
5	Lakhani (NH)	Leaf	65.4	90.4
6	Pimpalgaon (NH)	Leaf	69.9	7.9
7	Sakoli (NH)	Leaf	52.9	80.5
8	Mohadi (SH)	Leaf	44.8	78.6
9	Tumsar (SH)	Leaf	38.7	84.2
10	Adyal (SH)	Leaf	26.9	76.4
11	Pauni (SH)	Leaf	18.7	49.8

From the date of lead concentration in various places among Natural and State highway passing through Bhandara district, it is clear that there is direct correlation between lead concentration and traffic density roads. The contribution of vehicular emission for lead in roadside plant leaves is more among the National highways and that too from Nagpur to Bhandara. This is attributed to heavy traffic density up to Bhandara whereas the concentration of lead in both the lockdown and unlock time span is comparatively w on state highways due to reduced traffic density although the present lead content of the gasoline imported and distributed by petroleum companies is low the lead from previous uses or human activities may have long term effect.

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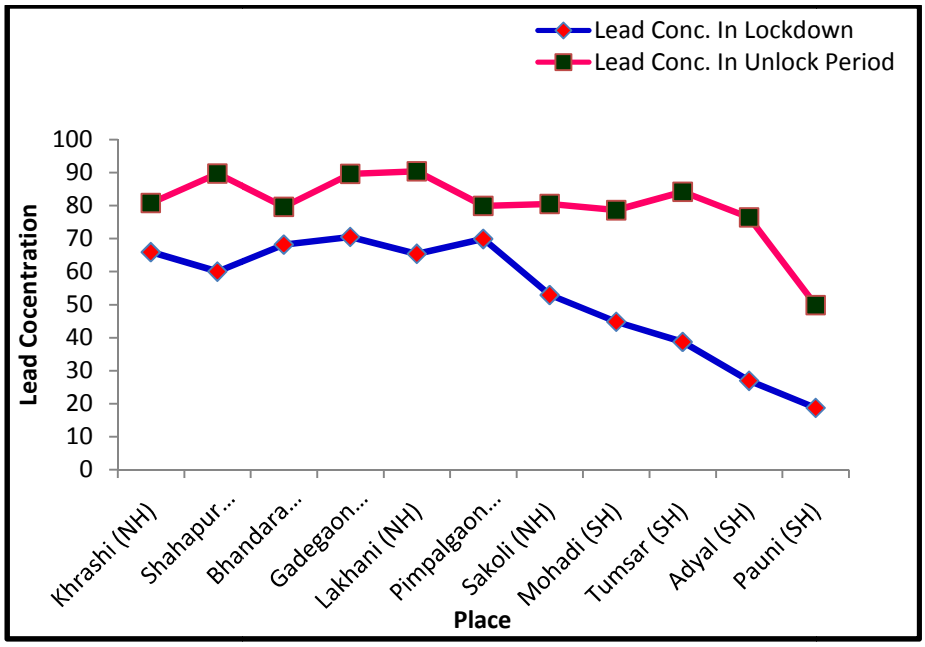

Figure 1: Variation of lead concentrations with traffic density during lockdown and unlock period.

IV. Summary and Conclusion

The study has shown that there is direct correlate between traffic density and lead concentration in roadside plant leaves. During the pandemic lockdown the traffic density was extremely low, therefore the ad content was found to be reduced. The unnecessary use of vehicle should be avoided. People must se public transport system for travelling purpose which will minimize the traffic density and ultimately lead contamination in flora and fauna. The use of electrical vehicle must be propagated through different company's so that the roadside plants, vegetable should be less affected by Pb contamination.

The colorimetric method to determine lead concentration is sensitive, selective less expensive and very useful for measurement of w metal concentration.

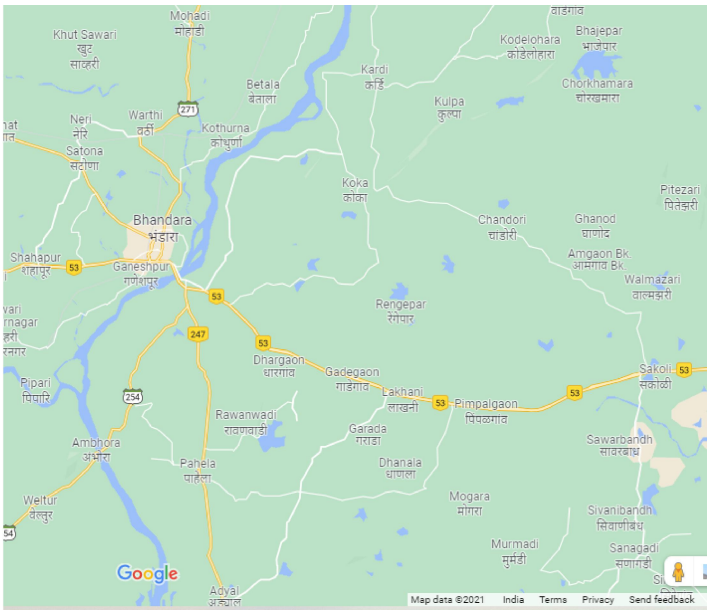

Figure: Geographical picture (https://www.google.com/maps/@21.1459581,79.6465372,11z)

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