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Environmental Pollution Due To Traffic Density Near Some Busy High Ways

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ABSTRACT

Environmental pollution represents a very serious problem facing public health . Pollution arising from car exhaust is steadily increasing from day to day. The present study was done to explore the pollution resulted from motor car exhaust near some busy high way in Kalybia Gvernorate . Eighty samples of soil and Wild grasses (40 each) in four localities were collected where the levels of some heavy metals, e.g. lead , cadmium , mercury , copper and zinc were estimated . Higher levels were recorded in localities near busy high ways.

INTRODUCTION

Environmental pollution of air, water, soil and food became a threat to continued existence of many plants and animals communities and may ultimately threaten human survival .

Ambient air pollution can contribute to the occurrence and / or aggregation of disease in industrial populations. The diseases that fall into this category are acute non - specific respiratory diseases, chronic bronchitis, pulmonary emphysema , bronchial asthma and lung cancer . The fact that pulmonary emphysema seems to be increasing especially in Urban areas points towards air pollution as a possible etiological factor (1). Some studies indicate that some pollutants interfere with the metabolism of trace elements and progesterone level necessary for maintenance of fertility in farm animals (2,3).

The concentrations of particulate in ambient air from fuel consumption in United States were 1000, 2000 and 500 mg/m³ for cadmium , lead and zinc respectively (4) . The best world wide prevailing standards for threshold limit values for eight hour occupational exposure were 0.02, 1.00 and 1.00 mg/m³ for cadmium , lead and zinc respectively (5)

Soil and vegetations in localities with atmospheric pollution may get contaminated through dumping of particulate matter on the surface of soil and vegetation. Beside surface contamination, vegetation grown in a contaminated soil usually accumulate such pollutants from the soil.

The present study aimed to clarify the magnitude of atmospheric pollution due to car exhaust nearby busy high ways through

estimation of some important pollutants in soil and vegetation growth in such contaminated localities .

MATERIALS AND METHODS

Sampling

Ten samples from each of soil and vegetation were collected from the following localities near the high ways :

- 1) Cairo - Alex high way of Shoubra.
- 2) Cairo - Alex high way at Takh.
- 3) Benha - Zagazig high way at Menia El-Kamh.
- 4) Control samples of soil and vegetation collected from Moshtohor (rural area away from high way , used as control).

Samples of soil and vegetation were digested (6) and the concentrations of lead , cadmium mercury copper and zinc were determined by Atomic Absorption Spectrophotometry with alteration of standard burner head of A. A.S. in relation to the light beam of the examined metal . The method of estimation was previously recommended (7) . Statistical analysis was carried out using T - test (8).

RESULTS AND DISCUSSION

Recently , and parallel to the technology progress in industry and the rise of other numerous sources of atmospheric pollution like motor car exhaust , the hazard effect of environmental pollution became a real problem threat the existence of all living creatures on this planet . The respiratory tract of individuals and animals is increasingly exposed to air born contaminants which may exert systemic effect after absorption, and distribution to other tissue or it may induce local effect on respiratory tract or both .

Five major pollutants cause about 98% of air pollution. These were CO (52%), SO₂ (18%) hydrocarbons (12%), particulate matter (10%) and nitrogen oxide (6%). The picture would vary widely in individual localities in accordance with the different activities (1).

In this study we reveal some atmospheric pollutants through measurement of their level in soil and local grasses which might get contaminated with these pollutants due to dumping of particulate matter.

Our results tabulated in Tables (1) and (2) and graphically represented in Figs. 1 and 2. Result reveal that level are significantly increased either in grass samples (Table 1) or in soil samples (Table 2) in examined localities (Shubra, Tukha, and Menia El-Kamh) compared to their levels in samples obtained from rural control area (Moshtohor). The increased concentration of lead in grasses was parallel to its level in soil Cairo - Alex high way at Shubra, recorded the highest concentrations (1.55 ± 0.002 and 1.682 ± 0.002) followed by Menia El-Kamh (1.028 ± 0.001 and 1.162 ± 0.008) and Tukh (0.700 ± 0.001 and 1.103 ± 0.006) in local wild grasses and soil respectively.

Similar to lead, the top cadmium concentration was recorded in Shubra (0.067 ± 0.0002 and 0.0193 ± 0.0003) followed by Menia El-Kamh (0.055 ± 0.0002 and 0.157 ± 0.0003); Tukh (0.045 ± 0.0002 and 0.117 ± 0.0004) and the lowest concentrations was recorded in Moshtohor (0.012 ± 0.0002 and 0.067 ± 0.0004) for wild grasses and soil respectively.

Table (1) : Statistical analysis of metal concentrations (ppm) in samples of wild grasses collected from areas near sme busy high ways (Mean \pm S. E.) on wet matter bases .

Locality metal	Moshtohor	Shoubra	Tukh	Menia El-Kamh
Lead	0.208 ± 0.006	$1.155 \pm 0.002^*$	0.700 ± 0.001	$1.028 \pm 0.001^*$
Cadmium	0.012 ± 0.0002	$0.067 \pm 0.0002^*$	$0.045 \pm 0.0002^*$	$0.055 \pm 0.002^*$
Mercury	N.D.	N. D.	N.D.	N.D.
Copper	0.022 ± 0.0002	$0.187 \pm 0.003^*$	$0.103 \pm 0.0002^*$	$0.152 \pm 0.0002^*$
Zinc	N.D	$0.042 \pm 0.002^*$	$0.017 \pm 0.003^*$	$0.042 \pm 0.001^*$

* Sig. at P < 0.05

ND = Not detected

Fortunately, mercury was not detected in the examined grasses, however, mercury levels in soil obtained from Shubra, Tukh ad Menia El-Kamh was significantly higher than its level in Moshtohor. We suggested that mercury may be fund in non - soluble form which is not available to be taken up by the local plants.

It should be known that lead, cadmium and mercury have a acumulative effect in the tissue of human or animals. This of course make the problem of pollution with these metals more complicated. Several studies indicated the cumulative effect of these metals in different tissues (8,10, 11, 12, 13).

Concerning the public health significance of the aforementioned metals, several studies dealt with their toxicities. These metals are unknown to be essential for the functioning of biological systems. Lead inhibit hemoglobin synthesis and adversely affect the central and peripheral nervous system and the kidneys. Cadmium adversely affect several important enzymes. It can cause painful ostomalacia and kidney damage (14). Mercury is extremely toxic metal in all forms. It is a cumulative poison because of the high tissue affinity (13).

In contrast to lead, cadmium and mercury; copper and zinc are essential elements having roles in the biological function of the body. Also, copper and zinc does not accumulated in tissue (16). Our study revealed the copper and zinc were more pronounced in grasses and soil samples

Fig.(1) Statistical analysis of metal concentrations (ppm) in wild grasses collected from areas near some busy high ways wet bases

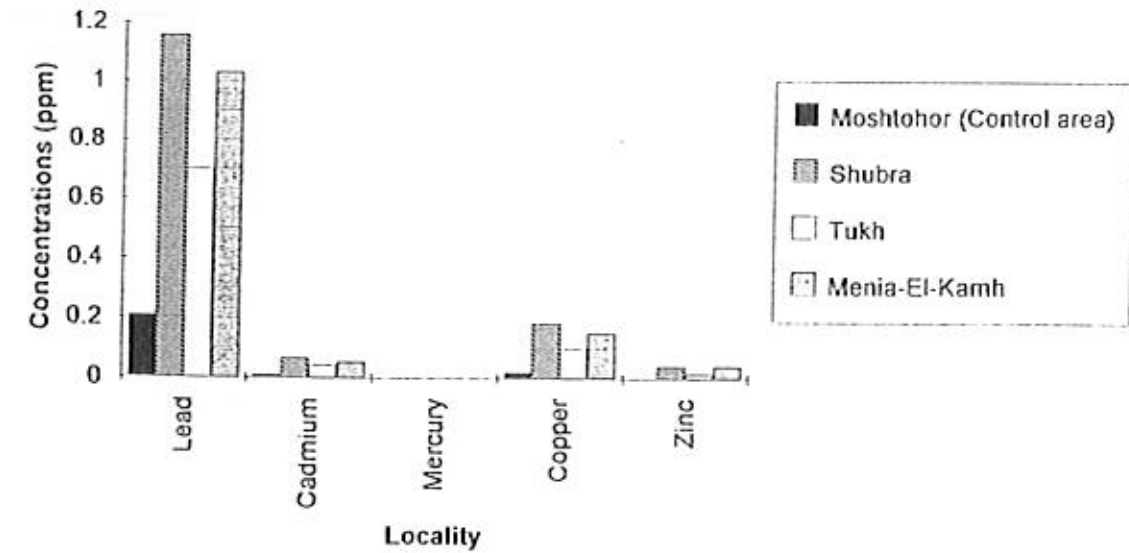


Fig.(2): Statistical analysis of metal concentrations (ppm) in soil collected from areas near some busy high ways wet bases

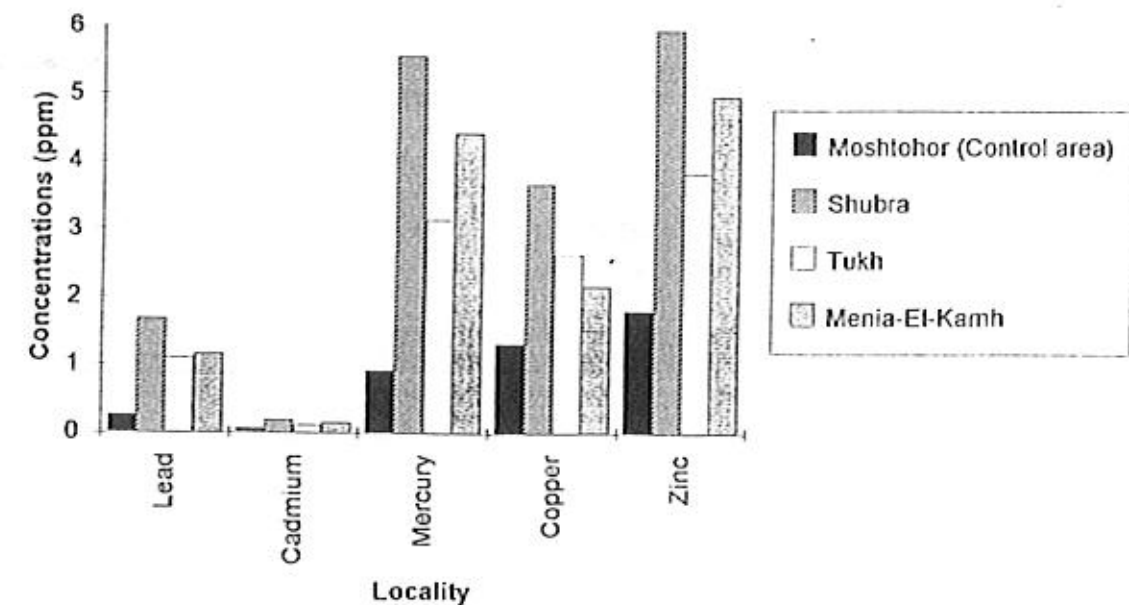


Table (2) : Statistical analysis of metal concentratins (ppm) in soil samples collected from areas near busy high wasys (Mean ± S. E.) on wet matter bases .

Locality metal	Moshtohor	Shoubra	Tukh	Menia El-Kamh
Lead	0.260±0.005	1.683±0.002*	1.103 ± 0.006*	1.162 ± 0.008*
Cadmium	0.067±0.004	0.193 ±0.0003*	0.117 ± 0.004*	0.157 ± 0.0003*
Mercury	0.917±0.020	5.567 ±0.005*	3.150 ± 0.027*	4.433 ± 0.023*
Copper	1.325±0.003	3.680 ± 0.010*	2.637 ± 0.004*	2.173 ± 0.005*
Zinc	1.810±0.007	5.960 ± 0.150*	3.840 ± 0.010*	4.975 ± 0.025*

* Sig. at P< 0.05 ND = Not detected

collected from Shubra followed by Menia El-Kamh and Tukh, respectively, while their level was the least in samples collected from the control area at Moshtohor .

In conclusion :

- a - The present study proved that there is a considerable level of pollution due to traffic and it reflected on the level of heavy metals in soil and plants.
- b - Animals and poultry farms should be constructed away from higher ways and their feed should be obtained from safe source free from metal contaminants .
- c - Strict measures should be applied to minimize pollution from traffic either using a good quality fuel or application of devices that control motor car exhauston perfectly or extensive application of clean fuel material , e.g. natural gas as a clean source of fuel.

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الملخص العربي

تلوث البيئة الناتج عن كثافة وسائل المواصلات بالقرب من بعض الطرق الرئيسية

منى عشوب

قسم اللحوم ^{الحيوية} بكلية الطب البيطري جامعة الزقازيق فرع بنها

أجريت الدراسة بغرض إستبيان التلوث البيئي الناجم عن زيادة كثافة المواصلات عند بعض الطرق السريعة .

تم تجميع ثمانين عينة بواقع أربعين نباتات وأربعين عينة تربة من أربع مناطق هي :
 طريق مصر الأسكندرية الزراعي عند شبرا
 طريق مصر الأسكندرية الزراعي عند طوخ
 طريق بنها الزقازيق عند منيا القمح
 عينات من كلية الزراعة بمشتهر كجموعة ضابطة

تم قياس مستوى الرصاص والكاديوم والزنبق والنحاس والزنك في هذه العينات . أثبتت الدراسة وجود علاقة بين كثافة المواصلات على الطرق السريعة والتلوث البيئي بهذه المعادن .