

LIVER LEAD LEVELS OF SLAUGHTERED CATTLE IN BURSA

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SUMMARY

Bursa is a city of over two million with enormous environmental pollution problems. Lead, has an important role in environmental pollution, reaches to man with animal originated foods in ecosystems.

In the presented research, cattle liver samples were obtained from the animals which had highway feeding. Five liver samples from Çalı, five from Akçalar and ten samples from Bursa Meat and Fish Foundation (EBK) slaughterhouses were provided. All of the samples were ashed by nitric acid/perchloric acid (4:2 v/v) and lead levels were measured by Atomic Absorption Spectrophotometer with graphic furnace.

The estimated liver lead levels in Çalı, Akçalar and E.B.K. samples were 0.397 mg/kg, 0.270 mg/kg and 0.248 mg/kg, respectively.

Comparing to these values with other published data, it was observed that, all samples had high lead levels.

As conclusion, Bursa and surrounding are getting more polluted. These results were prompted us to carry out further investigation.

Key words: Lead, environmental pollution, liver lead level.

ÖZET

Bursa'da Kesilen İneklerin Karaciğer Kurşun Düzeyleri

İki milyonun üzerine varan nüfusuyla Bursa ciddi çevre kirliliği problemi ile karşı karşıya olan bir şehirdir. Bu kirlilikte önemli rolü olan kurşunun, ekosistemde insana ulaştığı en son nokta hayvansal kökenli gıdalardır.

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Sunulan çalışmada, anemnez ile şarampol besiciliği yaptığı belirlenen işletmelere ait ineklerden Çalı'da 5, Akçalar'da 5 ve E.B.K.'da 10'ar adet karaciğer numunesi alındı. Nitrik asit/perklorik asit (4:2 v/v) karışımı ile yaş olarak yakılıp, grafit fırınlı Atomik Absorbsiyon Spektrofotometresi yardımıyla kurşun (Pb) miktarları ölçüldü.

Çalı'daki numunelerde 0.396 mg/kg., Akçalar'da 0.270 mg/kg ve E.B.K.'da ise 0.248 mg/kg kurşun düzeyleri saptandı.

Çalışma sonucu elde edilen bulgular, literatür verilerinden yüksek bulundu. Bu sonuçlar bizleri daha ayrıntılı çalışmalara yöneltti.

Anahtar kelimeler: Kurşun, çevre kirliliği, karaciğer kurşun düzeyi.

INTRODUCTION

In recently, the industrial development has been responsible for the diffusion of many chemical substances in the environment causing the pollution of waters, soil and atmosphere^{1,2,3}.

Among the various aspects of the environmental pollutant special attention must be directed to heavy metals, which are shown a remarkable tendency to accumulate in tissues and organs of men and animals^{4,5}. Heavy metals levels of tissues are good indicators of the environmental pollution and reflect the result of recent exposure to heavy metals^{1,3,5}.

Lead, which has been mined and used for many centuries, is one of the most important heavy metals⁶. Biological interest in lead is due mainly to its toxicity for man and animals. Lead is cumulative poison taken into the body in food and water as well as air. The absorption of lead in body is slow and the symptoms appear late^{6,7}. It is mainly stored in bones and liver excreted by urine, milk, feces. In case of administration of an amount more than 0.6 ng/day; it is stored within the body⁸.

In all domestic species, lead poisoning causes derangement of the central nervous system, gastrointestinal tract, muscular coordination and the red blood cell synthesis. In cattle signs of toxicity include a depressed appearance, blindness, grinding of teeth and convulsive seizures^{7,8,9,10,11}.

Liver lead levels were determined in various groups and different societies throughout the world^{4,12,13,14,15,16,17}.

The results of various liver lead levels are given in Table I.

Table: I
Various Liver and Levels of Cattle

Samples (n)	Country	Pb Levels	References
30	ITALY	0.405 + 0.365 mg/kg	Cocchieri et al. ¹²
50	GERMANY	0.079 — 0.610 mg/kg	Holm ¹³
20	TURKEY	0.2337 mg/kg	Mutluer et al. ¹⁴
—	PAKISTAN	0.40 - 0.45 ppm	Ali et al. ¹⁵
—	GREECE	0.740 ppm	Zaftopoulos et al. ⁴

The purpose of this research was to determine the amount of liver Pb levels and to compare different location due to industrial pollution.

MATERIALS AND METHODS

Samples of 20 liver (*Lobus caudatus*) from cattle, which were slaughtered in three sanitary slaughterhouses were used as material.

Sample preparation: The method described by McForlance and Franzin¹⁵ was followed and each sample (5 g) was separately digested in a Kjeldahl flask using a mixture of nitric and perchloric acid (4:2 v/v) on direct flame. The reagents used were grade from Merck. Double distilled deionized water was used for sample preparations.

The digested cooled sample was diluted to 25 ml and directly used for determination of Pb by Atomic Absorption Unit Model Varian 30/40 with grap-hite furnace¹⁸.

RESULTS AND DISCUSSION

The lead levels of the liver obtained from different slaughterhouse were shown in Table II.

The 5 liver samples in EBK were from the Research and Training Farm, Uludağ University, Faculty of Veterinary Medicine which was located far from industrial areas.

Table: II
The Lead Levels of Liver From Three Different Slaughterhouse

Slaughterhouse	n	Av. (mg/kg)	Min. (mg/kg)	Max. (mg/kg)
Çalı	5	0.396	0.188	0.578
Akçalar	5	0.270	0.193	0.334
E.B.K.	10	0.247	0.085	0.690

Bursa is a city of over 2 million with faced to enormous environmental pollution problems which come from industrial factories. Although Cd, Hg and lead (Pb) have important industrial uses, biological interest in this metals is mainly due to their potential toxicity for man and animals when they are released into the environment. Thus, the amount on lead entering the food chain of animals and humans is a primary concern to food hygienists^{1,3,5,8}.

Lead is one of the major elements indicates environmental pollution as Cd, Hg, etc. The heavy metals including the lead content were found gradually decreasing in sample of from near highway to interior of land. Liver in an appropriate target organ for chronic exposure to heavy metals. Exposure to various toxic metals such as Cd, Ni, organic mercury and lead^{7,9,19,20}.

In this research examined animals were chosen by anemnesis which had highway feeding. Three different slaughterhouse were also chosen according to their distance to city centre.

Liver lead levels in analyzed samples are summarized in Table II. The highest average liver lead amount were found in Çalı secondly in Akçalar. The lowest values were estimated in EBK samples (Table: II). But it had great variations. One of the sample had 0.690 mg/kg, 5 samples of E.B.K. were come from normally feed cows which were kept 17 km from city center. This value was within the acceptable limits compared to German guide values for Pb in livers (0.8 mg Pb/kg)³. The difference between these three groups may arise either from the higher exposure to dust borne lead due to heavy traffic, atmospheric pollution or highway feeding. There are a lot of farms were use of local forage is present, so the livestock lead ingestion may be uncontrolled and is closely related to the intensity of local road traffic and industrialization.

As a result we observed that the lead contents in cattle livers were higher than those of other researchers in liver Pb levels^{12,14,16}. Liver lead levels are dangerously high and efforts at Governmental level are required to alleviate the situation.

These results were prompted us to carry out further investigations.

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