

# IDENTIFICATION AND ANALYSIS OF HEAVY METALS IN BLOOD AND URINE SAMPLES FROM THE COMMON PEOPLE OF ARIYALUR DISTRICT OF INDIA

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**Abstract** : Identification of heavy metals which are presented in the blood and urine samples of common adults of Ariyalur district are reported. Analysis of them through atomic adsorption spectroscopy and the data were characterised as lead (Pb) and chromium (Cr) of major contaminant.

**IndexTerms** - Heavy metals, blood and urine samples, Ariyalur district

## I. INTRODUCTION

Soil and water are the important prosperity of the world. Urbanisation and deforestation reduce the abundance of them. Due to urbanisation, the needs of industry is highly envisaged by the government to manage the unemployment. It causes the unwanted contaminants in soil and water. One of the known contaminants are heavy metals whereas they are essential for human growth in traces level. When the level crosses the moderate, it damages the organic system of human body. In recent days, next to China, India is thoroughly occupied by the industries and the ecological systems are highly disturbed. Heavy metals lend through the outlets of industries are non-digestible by the organisms like plants and the microbes found in the soil. Air and water are the important carriers of heavy metals and the later can be accumulated on human body through food chain.<sup>1,2</sup>

In Ariyalur district, particular surroundings of V. Kaikatti are being underwent deforestation due to an automatic death of plants and urbanisation. It implied a wide distribution of heavy metal pollution. The levels of various elements such as Cd, Hg, As, Cu, Pb, Ni and Cr detected from vegetable, fruit and rice samples were found to exceed the limit of standards for food hygiene, indicating that heavy metal pollution had posed a threat to agricultural product quality, food security and human health.<sup>3,4</sup> We already reported open well quality parameter in industrial zone of the Ariyalur district and soil fertility and sustainability at the same area.<sup>5,6</sup> Nowadays the analysis of water and soil samples on the same district and the publications related to them are increased drastically.<sup>7-10</sup> Several studies on heavy metal toxic analysis of blood, urine and hair samples collected from the various region of in and out of state and countries were reported.<sup>11,12</sup> In our study Pb and Cr contaminant on blood and urine samples collected from Ariyalur district were analysed and reported.

## II. STUDY AREA

Samples were collected unanimously from the associated areas of V. Kaikatti of Ariyalur district, Tamilnadu, India. Ariyalur is an industrialised township with cement and sugar factories. A smallest district head quarters of Tamilnadu and about 310 km far away from the capital, Chennai.

## III. MATERIALS AND METHODS

A total elemental analysis usually not necessary for an assessment of sample contamination with heavy metals. However, if such an analysis desired, a rapid and reasonably precise methods that include lead and cadmium is an aquaregia-HF digestion for 1 hr at 100°C in a teflon-lined bomb. In addition strong acid such as concentrated nitric acid and aqua regia are often used to determine total metals in samples. Cadmium and lead were determined spectrophotometrically at a wavelength of 253.7 nm.

A Compact Atomic Absorption Spectrophotometer Created from Shimadzu's Double-Beam Technology was used; The study was conducted in accordance with the AOAC (2000) Official Methods of Analysis. 17th Edition, The Association of Official Analytical Chemists, Gaithersburg, MD, USA. Association with later the procedure as cited in APHA 1975 was also directed.

## IV. RESULTS AND DISCUSSION

Until, nothing is referred as a standard method to assess heavy metal content in human body with more accuracy. For low-dose chronic exposure of heavy metals, blood sample is generally considered a better indicator as it can reflect the recent comprehensive information of various elements in human body.<sup>13,14</sup>

Chromium is generally distributed as trivalent in adrenal gland, bone, brain muscles and the skin. It is essential as blood sugar regulator to human body in minute amount to help insulin to promote the efficiency of glucose entering the cells. Chromium

content in urine and blood still lacks standard value. Urine is the most efficient sample and it shows accurate results to identify diseases like diabetic.

About the influence of smoking to heavy metal content in human body, there were more reports. Ashraf and Han both reported that content of cadmium and lead was higher in smokers than in non-smokers.<sup>15,16</sup> In the 10 cases of blood samples in this study, we just identified the non-smokers, a permanent residence of a generation are picked as volunteers and the results were tabulated (Table.1).

**Table.1. Heavy metal analysis using Atomic Adsorption Spectrophotometer**

S.No	Sample Code	Urine		Blood	
		Lead (ppm)	Chromium (ppm)	Lead (ppm)	Chromium (ppm)
1	I	0.0004	1.07	0.00005	1.95
2	II	0.00052	2.08	0.00012	0.92
3	III	0.0002	1.37	0.00037	0.921
4	IV	0.00016	1.16	0.00019	0.154
5	V	0.00012	1.42	0.00029	0.879
6	VI	0.00019	1.46	0.00035	0.92
7	VII	0.00008	2.57	0.00022	1.102
8	VIII	0.00015	3.93	0.00046	0.67
9	IX	0.00017	0.80	0.0004	1.08
10	X	0.0001	4.43	0.00034	0.89

For the determination of lead and cadmium, about  $10 \pm 0.001$  g of homogenised sample were weighed in to a 200 mL beaker and 10 mL of concentrated nitric acid were added. The beaker was covered with a watch glass, and after most of the sample was dissolved by standing overnight. It was then heated on a hot plate with boiling until any vigorous reaction had subsided. The solution was allowed to cool, transferred into a 50 mL volumetric flask and diluted to the mark with distilled water. For each run, a duplicate sample, spiked samples for recovery and two blanks were carried through the whole procedure. Cadmium and lead concentrations were determined through spectrophotometer at a wavelength of 253.7 nm.

#### 4.1. Estimation of Chromium

A sample is preserved in the field with mineral acid. The sample aliquot is mixed with diphenylcarbazide in an acid solution. A red-violet colour is produced. (The reaction is very sensitive as the absorbance index per gram of chromium is approximately 40,000 at 540 nm). The absorbance is measured and compared to identically-prepared standard and blank solutions, ensuring the blank is subtracted, at a wavelength of 540 nm.

In summary, heavy metals like lead and chromium were detected in both blood and urine samples of a adults in V. Kaikatti in Ariyalur district of southern Tamilnadu, India. The permanent residence of a generation and adult non-smokings are considered for the sampling and the heavy metal content was investigated. These data can serve as reference for further research.

The study comprised of non-financial companies listed at KSE-100 Index and 30 actively traded companies are selected on the bases of market capitalization. And 2015 is taken as base year for KSE-100 index.

#### V. ACKNOWLEDGMENT

The authors thank Collegiate education, Tamilnadu for endorsement of research at Government Arts and Science College and Amphi Gene Research Laboratories for providing Atomic Adsorption Spectrophotometer facility.

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