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Short Report

Majid MUMTAZ[1]
Azhar SİDDİQUE[1]
Nadia MUKHTAR[1]
Tabassum MEHBOOB[2]

Status of Trace Elements Level in Blood Samples of Different Age Population of Karachi (Pakistan)

[1]Department of Chemistry, University of Karachi, Karachi 75270, Pakistan
[2]Department of Biochemistry, University of Karachi, Karachi 75270, Pakistan

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Trace elements play an important role in human health and disease. Trace elements participate in tissue, cellular and subcellular function. These include immunoregulation by both humoral and cellular mechanism, nerve conduction, muscle contraction, membrane potential regulation, and mitochondrial activity, among others (1, 2). Although these trace elements constitute a relatively small amount of the total body tissues, they are essential to many vital processes. Increased interest in the biological aspects of metals has come with the establishing of sophisticated instruments, industrial revolution and exposure of men to metals in an occupational setting and the recognition of toxic states.

In present days, exposure to toxic metals like lead in daily life increased marginally. In densely populated urban area of Karachi with more than 10 million population surviving with a mean concentration of 2989 ppm lead in street dust and annual addition of 28, 447 Kg of lead in the environment (3). Cadmium is also a cumulative toxic agent and its half life in blood is estimated to be 2-3 months (4), smoking, tobacco chewing, as pigment in plastics, electric batteries and as an anticorrosive use of cadmium are the source of cadmium exposure to human (5, 6). Also the level of essential elements like copper, zinc, iron, and probably chromium indicating the status of environment and responsible for differnt biological functions.

Since last decade there are number of research project are under way to investigate the effect of metals and their levels in the body fluids and wherever possible, the effects on health. Because the level of trace elements in blood vary considerably between global population (7, 8) and the normal ranges for typical populations was different. So it is clear that ranges for trace elements in blood of normal population would have to be established for the region, which help for further work to proceed. The main object of the present study is to investigate the level of trace elements in the blood of population of Karachi.

The normal subjects were divided into two groups according to their age group. Group "A" ranged from 18-35 years of age consisting twenty one females and thirty two males and other group "B" ranged from 36 to 60 years of age having Seventeen female and forty eight male. The subjects were students, teachres, lab staff and office staff of Karachi University, from different socio-economic groups and living in different areas of Karachi. A detailed questionnaire was filled out by individuals in which general information about identity, personal history, consumption of food and beverages, health status etc. was collected. Sampling was carried out during the month of July-October 1997 and September-January 1999. 10 ml of blood sample was taken from the antecubital vein of each of sixty-five volunteers and proceeded according to the method described earlier (9).

Standards, samples and blank for estimation of copper, zinc iron, lead, chromium and cadmium were aspirated into a Perkin Elmer 5000 Atomic Absorbtion Spectrophotometer, equipped with Zeeman background corrector and graphite furnace. The temperature programming for the heated graphite atomization analysis was set as described in literature (10). The flow of purge gas and the volume of sample injected were selected according to the analyte concentration in order to obtain a response in the linear or non-linear calibration range. Results were expressed as mean±S.D. The means of findings were statistically evaluated by Student t-test (11).

The results obtained from the estimation of copper, Zinc, Lead, Chromium, Cadmium and Iron in the blood samples are given in the table. The normal ranges for each metal in blood of group "A" and group "B" as diferent and in case of Chromium, Iron, Zinc and Copper the difference is significant ($P<0.001$) whereas non significant difference of lead and cadmium was observed. In present study, the blood samples were used without sex difference, both male and female subjects were used because previous studies showed that normally the difference of trace metals between the sexes was non-significant (8, 12, 13). Table shows that no significant difference of lead in blood of group "A" and group "B" was observed but the mean value of both groups are at higher risk. It has been shown that lead levels as low as 25 μ gm/dl caused irreversible chronic nephropathy, shortened the red blood cell life and an irreversible loss of IQ in child (4). The level of lead in group "B" is sligthly higher but statistically non significant, this might be due to the more exposure to the environment as compare to younger one. Another reason for high blood lead level is due to the extensive use ıf Tetraethyl lead and Tetramethyl lead as fuel (14). Tetraethyl lead breaks down during combustion forming trialkyl lead compounds, which are readily soluble in water and are, therefore, quickly absorbed in the body by inhalation. It has also been estimated that 30-50% of lead in inspired air may ultimately be retained by the body (15). Thus lead in air, introduced primarily from the combustion of leaded gasoline is considered as a significant source of lead pollution. Base line data peresented earlier (3), also confirmed that main contribution of lead in the urban environment in Karachi was the automotive exhaust. As shown in Table the differences in mean values were found between blood cadmium level of group "A" and group "B". The blood cadmium level has usually been regarded as an indicator of recent exposure and blood cadmium level of adults. The high level of cadmium in group "B" possibly due to more exposure to smoking habits are directly responsible and related to the raised cadmium levels reached in the blood (16). The low levels of copper in group "B" showed that with increase in age the copper containing proteins *Ceruloplasmin* loses its capability to hold the Copper in the moiety. It was suggested that Coppor deficiency might be an etiological factor in the development of cardiovascular disease and certainly rats fed a diet high in Zinc and low in Copper developed hypercholesterolaemi & Cardiovascular abnormalities. There is evidence of this happening in humans too (17). Another possibility of this decrease in copper content is attributed to the availability of Zinc, high amount of Zinc is tend to block the uptake of copper by increased synthesis of a Copper binding legend in mucosal cells thus making the copper less available for transfer to the blood (18). The younger group having the high contents of iron as compare to the older ones. One possibility for the low content of iron whole blood that with the passage of time iron transfer & storage proteins losing their functional

Table. Concentration of trace elements in the blood of Normal population of Karachi city.

METALS	Group "A" (21F+32M=43T)	Group "B" (17F+48M=65T)	%CHANGE	Significance P>
COPPER*	99.95±4.73	86.32±2.38	13.63	0.001
ZINC*	620.36±17.43	661.48±20.32	6.62	0.001
CHROMIUM*	4.13±0.78	3.09±0.82	25.18	0.001
IRON**	48.21±1.20	40.41±0.94	16.18	0.001
LEAD*	19.80±2.57	22.76±2.18	11.87	0.01
CADMIUM***	50.22±7.32	54.13±8.32	7.78	0.01

F=Famela; M=Male; T=Total

* u gm/dl±S.D.

** m gm/dl±S.D.

*** μgm/l±S.D.

capabilities to hold and store iron in human body as compare to the younger one. Another, the diet is an important factor because in older age many of the persons restricted towards the diet by different health problems. Another important effect of diet is reflected in "Chromium" levels, increased use of sugar containing foods in our customized society, with the passage of time β-cells of islets doesn't produce as much insulin as required to metabolize the sugar, as a result a decrease in chromium contents is established. Further studies are required to find out the further aspects and reasons for such alarming levels of metals in the population of Karachi.

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