Estimating the Concentration of Some Heavy Metals (Cadmium and Nickel) in Blood Serum Samples of Lung Cancer Patients in Iraq

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ABSTRACT

Through the study, which took into account 20 samples of healthy blood serum among males and females and 50 samples of blood serum from cancer patients lung also among males and females, the concentrations of Cadmium and Nickel levels were studied in parts per billion units where the marginal concentrations were high for healthy males and females. Unlike Nickel, this study supports the hypothesis that the exposure of Cadmium and Nickel increases lung cancer risk. These findings can accelerate the diagnosis and treatment of Lung cancer .There is a need to conduct more studies and research with more samples to determine whether the heavy metals have a role in causing the lung cancer.

Keywords: Lung cancer, blood serum sample, SPSS Program, atomic absorption spectroscopy

Introduction

Many diagnostics have proven that lung cancer is responsible for most cancer-related deaths. In addition, the disease is more common in men than in women. Around 1.7 million annually worldwide die due to this disease. Diagnostics have shown that there are several variables that lead to this disease, such as the accumulation of genetic genes and disease-suppressing genes. Therefore, the term "heavy metals" is used to refer to a cluster of metals and metalloids through a thickness of more than 5 g/cm^3 or further than five times the density of water. The term “heavy metals” is used to refer to a cluster of elements that have important chemical properties such as lead, cadmium, mercury, silver, chromium, nickel, cobalt, copper, iron, and group of platinum metals [6]. Therefore, they are categorized into two groups: Firstly, "macro elements", the physique contains absorption of these basics more than 0.01% and they are O, C, H, N, Ca, P, K, Na, S, Cl, and Mg. It is demonstrated that the total physique gratified of these rudiments equals a regular human heaviness of about 70 kg of a few grams of magnesium and forty kilograms of oxygen. Because of its main role in the formation of organs and tissues, therefore, the term organic generators refers to this group, which is O, H, C, N, P, and S. Secondly, the term trace elements is used to refer to a group of elements such as Fe, Zn, F, Sr, Mo, Cu, Br, Si, Cs, I, Mn, Al, Pb, Cd, B, and Rb. In addition, all these rudiments are stimulated in the body in varying quantities ranging from hundreds of milligrams to several grams. Although their minor gratified, they are not components of organic materials, but

instruments of a complex physical organization that has a role in adaptable several energetic purposes in altogether phases of growth of living creatures. Thirdly, the term "ultra trace elements" refers to elements whose absorption is less than 0.000001%, and these are Se, Co, V, Cr, As, Ni, Ti, Ag, Sn, Be, Ga, Hg, Sc, Zr, Bi, Sb, U, Th, and Rh. All of these elements are measured in the body in milligrams or micrograms. Nowadays, numerous basics belonging to this collection have been found to be necessary for living organisms, such as selenium, cobalt, and chromium (7-8).

According to recent studies, these elements have a role in the onset of cancer and can also be used as biomarkers. In addition, some weighty metals like a principal, cobalt and iron are human carcinogens according to epidemiological evidence. Most cancers were caused by ecological and professional contact to these metals.

Most cases of lung cancer are due to the close association among humanoid inorganic stages and lung cancer, according to biochemical studies. Thus, the list included several minerals, including B, Ca, Mg, Ni, Se, Co, Cr, Fe, Mn, and Zn. But, the levels of minerals and their risk of causing injury were inconsistent and regular according to the results. Some studies have shown a positive association or inverse ratios, but others denied the existence of any association. Therefore, it was necessary to analyze the trace elements in cancer-stricken bodies and healthy bodies in order to explain this relationship. Therefore, by focusing on the study of trace elements as well as early examination, the prominence of this reading lies in the point that it emphases on detecting a malignant disease.

Experimental Methods

Sample Collection.

Samples are collected from people after their overnight fast, by gathering intravenous plasma in 5 mm pipes, and so the examples are centrifuged at 3000 revolutions per minute before 15 minutes. Furthermore, the tubes are stored at a temperature ranging from 2-8°C to be analyzed within a day. Thus, the serum is examined by atomic absorption spectroscopy. The researcher collected 50 samples from the Middle Euphrates Cancer Center in Al-Najaf Governorate and Al-Diwaniyah General Teaching Hospital. Moreover, 20 samples were collected from healthy people, and then the tint is detached from the plasma by centrifugation. Then, the samples are stored in Abendrouf tubes to be stored in refrigerators prepared for measurement. After digestion of the serum samples, the samples are raised to the laboratory to study the absorption of trace basics such as nickel and cadmium through flame atomic concentration spectrometer (AAS). It should be noted that the elements are calibrated with the device before measurement, as shown in the figures below.

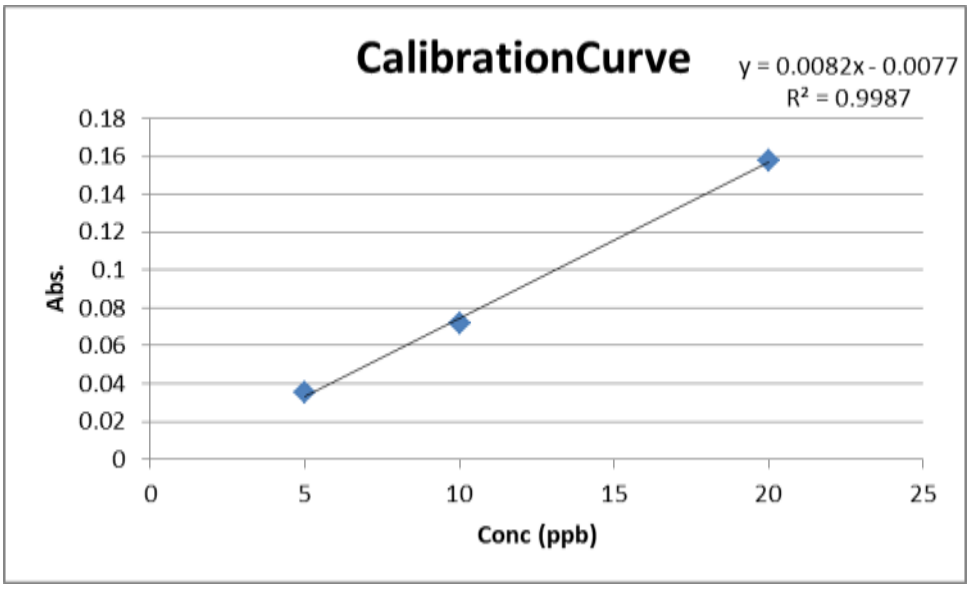

Figure 1. Calibration of the atomic absorption system for Nickel .

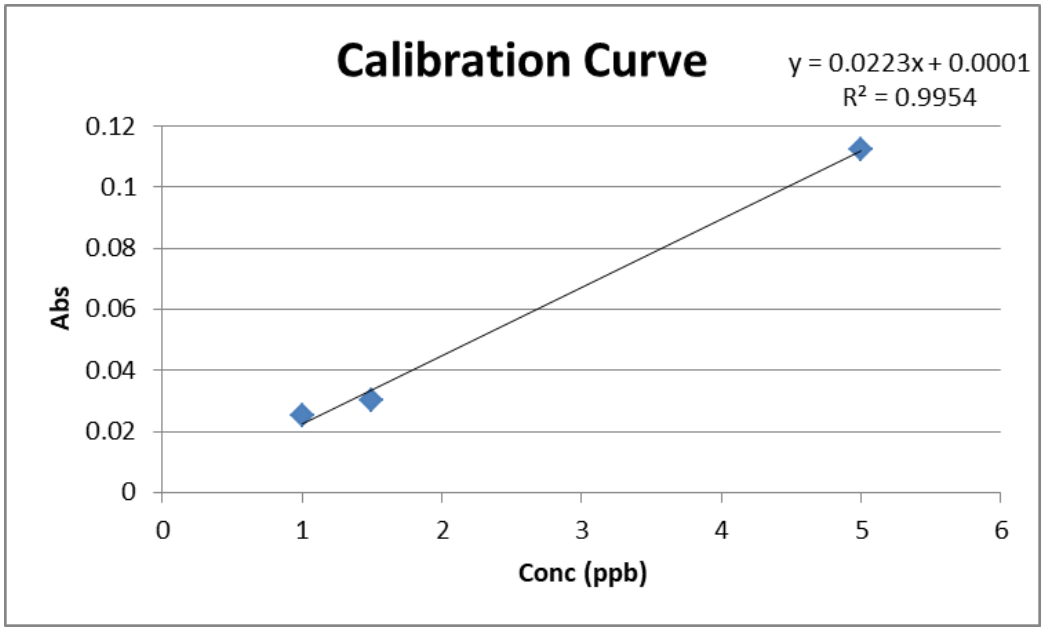

Figure 2. Calibration of the atomic absorption system for Cadmium.

Numerical analysis

The SPSS form 20 software is used by the researcher to examine the samples after testing it independently. In order to show the statistical value between the samples, the researcher made an assumption that a statistical is significant of the p-value is lower than 0.05, this means that there is a statistical significance, but if it is greater, it means that there is no value for the relationship.

Results and Discussion

Data are categorized into two groups, the well collection and the patients collection (lung cancer) for both sexes. Moreover, mean±standard deviance for absorption of cadmium and Ni (p), and all collection was designed with p -value as exposed as in table (2). Table (2). Cd and Ni trace elements are used to refer a description of patients and healthy samples.

sex	Studies groups	No.	Cd (PPm)		Ni (PPm)	
			mean ±Std .Deviation	P value	mean ±Std .Deviation	P value
M	healthy people	13	6.884 ±2.044	0.001	4.743 ±8.647	0.001
	lung Cancer	25	4.14 ±1.249		9.683 ± 9.922	
F	healthy people	7	5.412 ±1.411	0.014	2.180± 1.81	0.039
	lung Cancer	25	3.943 ±1.284		4.428 ±2.976	

M: male, F: female

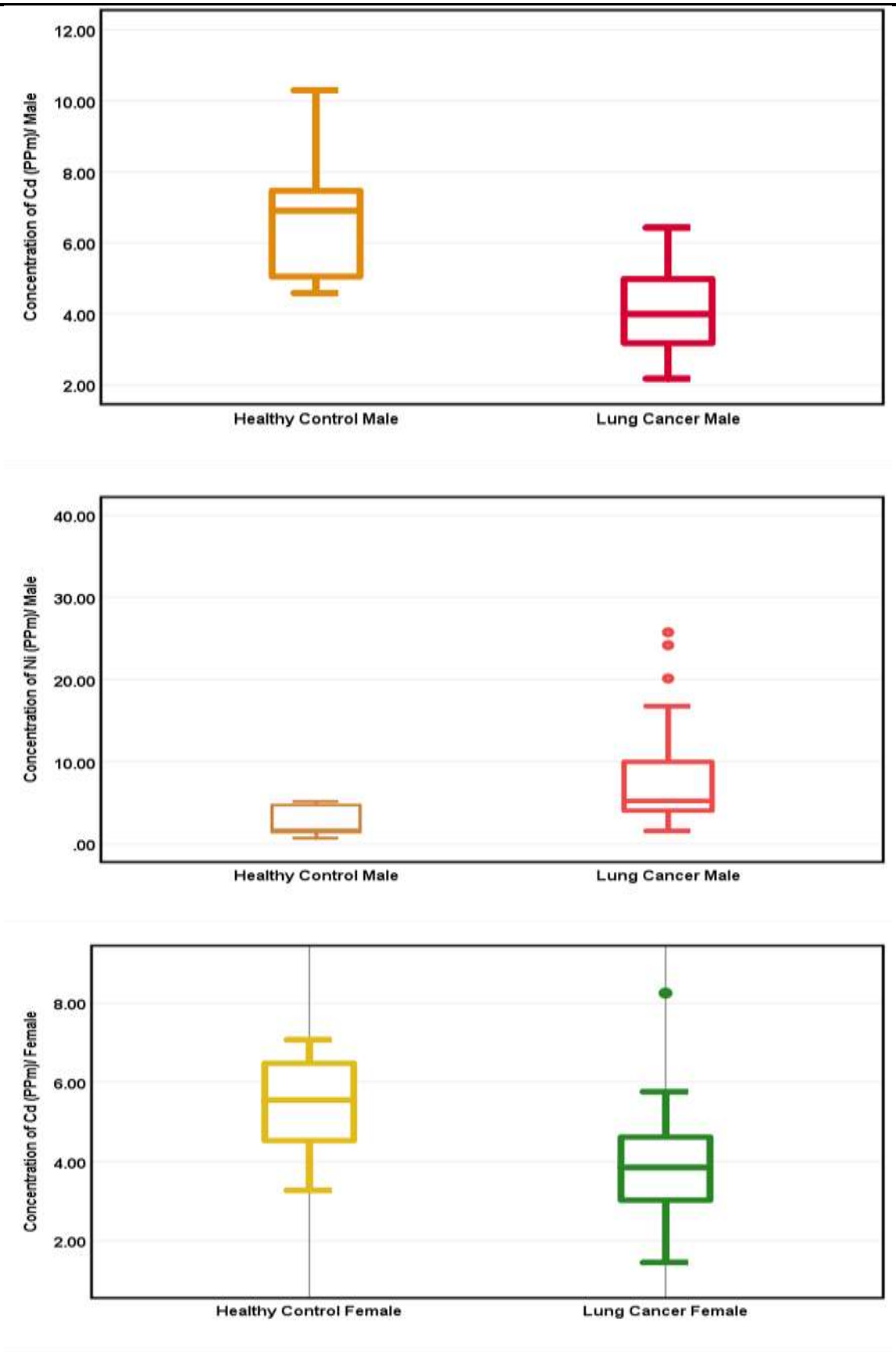

Figure 3. Contrast of serum absorptions (ppm) of Ni(a. male ,b. female) and Cd(c .male ,d .female) between healthy and Lung cancer

By observing Table (1), healthy males have lower Nickel absorptions than the mean (9.683) male patients with lung cancer. On the contrary, healthy people have a higher mean than lung cancer patients without statistical significance between the results. Thus, the value of p=0.001 is less than 0.05. Therefore, the study of differences is very important in order to show the rate of healthy people.

According to the quantitative analysis, the study showed that the blood serum of healthy females had a higher concentration of nickel (2.180± 1.81) than females with pulmonary disease. This result indicates an increase in the average of healthy women. According to cadmium levels, its percentage in healthy females is lower than that of lung cancer patients with a high statistical value, (p–value = 0.014). .

Through the statistical study of the samples, the researcher has concluded that the figures (a.1) and (b.1) have revealed in numbers the relationship or interdependence between the two groups. The study has exposed that males have good health in general, as a result of the comparison between healthy females and those with colon disease, and between healthy males and those with colon disease. According to the behavior of the manganese, two forms (c.1) and (d.1) have proven that females have a higher rate of colic disease. Thus, the comparison between the values of iron and manganese absorptions for healthy and sick patients is shown in the table below.

Conclusion

Some qualitative changes occur in the absorption of certain trace basics in patients through lung disease, according to some international studies. It turns out that there are changes in the blood serum of infected people. In all the analyzed samples, the results have shown that the percentage of nickel level was low, while the levels of cadmium were high. In order to understand lung cancer and its causes, this conclusion is very important. Thus, the statistical result is supportive of the ideas and opinions mentioned in the theoretical aspect.

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