

Article

Estimation of alpha-klotho protein and some biochemical parameters in atherosclerosis patients

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Abstract

The current study aimed to determine the concentration of alpha-klotho protein and some biochemical variables in patients suffering from atherosclerosis. The study was conducted between October 1, 2023 and October 30, 2023. The study included collecting 90 samples for both sexes, aged between 45 and 65 years, 60 patients with atherosclerosis, and 30 healthy controls (the number of patients was 25 women and 35 men). The resuscitation unit at (Ibn Al-Bitar Teaching Hospital in Baghdad obtained samples from patients based on clinical assessments, including echocardiogram and electrocardiograms, conducted by specialists at the hospital, including laboratory tests. There was no significant difference between the patient group and the healthy group in terms of alpha- klotho protein or other variables.

Key words: Alpha klotho protein, creatine kinase, liver enzymes, minerals

Introduction

Heart disease is one of the factors that affect blood circulation in the human body, which includes the heart and arteries. Heart disease can strike at any time in a person's life, and (rheumatic heart disease, inflammation of the heart and blood vessels, and atherosclerosis) are the most common.

The vascular system, which consists of arteries, veins, and capillaries that carry blood throughout the body and provides oxygen to all tissues and organs, can malfunction

and lead to heart disease ⁽¹⁾. Pain in the arms, left shoulder, and chest, dizziness, paleness, and vomiting are some of the symptoms associated with heart disease ⁽²⁾.

Overproduction of oxidized low-density lipoprotein, reactive oxygen species, and free radicals is the main cause of oxidative stress, which contributes to the development of cardiac disorders associated with heart disease ⁽³⁾. Atherosclerosis is a term that refers to heart tissue damage caused by prolonged ischemia and hypoxia ⁽⁴⁾.

The alpha-klotho protein, or Klotho, was first discovered by Koro-O and his group in 1997. ⁽⁵⁾ The anti-aging protein alpha-klotho plays an important role in energy metabolism, many cardiovascular diseases, and metabolic disorders ⁽⁶⁾. Renal failure leads to a decrease in the level of total klotho protein in serum ⁽⁷⁾. Atherosclerosis and cardiovascular disease are also among the diseases associated with Klotho deficiency ⁽⁸⁾.

Therefore, the study aimed to evaluate the concentration of alpha-klotho protein and some biochemical variables in patients with atherosclerosis.

Materials and working methods

Blood samples were collected from Ibn Al-Bitar Teaching Hospital in Baghdad from the resuscitation unit based on symptoms and clinical examinations, including echo, ECG, and laboratory results, in addition to data collected from patients, during the period from October 1, 2023 and October 30, 2023. Included: The study included 60 patients with atherosclerosis (35 men and 25 women), aged between 45 and 85 years, in addition to 30 healthy people, aged between 45 and 65 years

Collect blood samples

Prepare the serum

Drawing 5 ml of blood from a vein after sterilizing the drawing area with 70% ethyl alcohol using a sterile disposable medical syringe. Blood samples were placed in anticoagulant-free tubes to obtain the serum using a centrifuge at 3000 rpm for 15 minutes. The serum was then withdrawn using a micropipette, and then the resulting serum was divided into five or four parts using Eppendorf tubes to avoid decomposition of the samples. During the process of thawing and repeated freezing of the sample, the serum is preserved by freezing at a temperature of (-20 degrees Celsius) until the tests required in the study are performed.

Biochemical examinations

The concentration of α -Klotho was estimated using (a ready-made kit) and according to the method used by BT Lab using ELISA technology. The activity of creatine kinase was also estimated according to the method ⁽⁹⁾, liver enzymes were estimated according to the method ⁽¹⁰⁾, and minerals were estimated using the method ^(11,12).

Statistical analysis

The statistical program (SPSS V.25) was used, and the arithmetic mean and standard deviation (SD), as well as the means of the patient group compared to the healthy group, were determined using a T-test at a probability score ($P \leq 0.05$).

Results and discussion

The concentration of alpha-klotho protein, creatine kinase, liver enzymes, & minerals was estimated in patients with atherosclerosis & healthy controls, and the results are shown in Table 1.

Table 1:

Mean \pm SE of biochemical parameters in the two study groups

Parameters	Mean \pm SE		P-value
	Control	Patients	
α -Klotho (ng/ml)	4.784 \pm 0.274	3.008 \pm 0.144	P\geq 0.05
CK(ng/ml)	14.933 \pm 0.630	16.033 \pm 0.443	P\geq 0.05
AST(IU/L)	26.382 \pm 0.428	24.756 \pm 0.365	P\geq 0.05
ALT(IU/L)	24.059 \pm 0.592	30.542 \pm 0.547	P\geq0.05
Na(mmol/l)	111.273 \pm 3.647	124.307 \pm 2.483	P\geq0.05
P(mg/dl)	3.892 \pm 0.156	4.425 \pm 0.104	P\geq0.05

The results in Table 1 show that there is no statistically significant difference in the concentration of α -Klotho protein between the two groups of patients and healthy people. The results are consistent with Lam-Rachlin and colleagues in 2013, a decrease in blood levels of alpha-klotho occurs with alcohol consumption and smoking ⁽¹⁴⁾. It is possible that risk factors for cardiovascular disease behavior, such as alcohol use and smoking, lower alpha-klotho protein levels by raising oxidative stress. Whether due to overeating or obesity ⁽¹⁵⁾, a high BMI is associated with poor body weight balance, regulator and increases the risk of cardiovascular disease ⁽¹⁶⁾.

Scientists have found that the cerebral spinal fluid of overweight and obese people contains a much lower amount of alpha-klotho ⁽¹⁷⁾. In addition to finding an independent relationship between high blood triglycerides and low blood alpha-klotho levels, Kim and his group (2019) also found a link between alpha-klotho levels and metabolic syndrome ⁽¹⁸⁾.

The results also did not show a significant difference in the effectiveness of the creatine kinase enzyme between the two groups of patients and healthy people, as shown in Table 1

According to the research of Ahmed et al ⁽¹⁹⁾, and Jin and his group ⁽²⁰⁾, the reason for the increase in creatine kinase is that it is present in high concentrations in cells, as it

changes the permeability of the cell membrane, and this leads to the release of the enzyme into the blood in the event of heart disease. One of the factors that contribute to an increase in creatine kinase is the deterioration and damage resulting from myocardial injury associated with heart disease, and this leads to an increase in enzyme production and circulating levels ⁽²¹⁾, as the creatine kinase enzyme returns to normal 48 hours after the crisis occurs, as It reaches peak efficiency within 24 hours. Some organs, such as the brain (CK-BB) and skeletal muscle (CK-MM), produce creatine kinase in response to the condition, raising the level of the enzyme in the blood ⁽²²⁾.

Results of some previous studies showed that patients who had suffered a heart attack had significantly higher mean values for each cardiac index than patients without coronary heart disease, and higher CK-MB levels on admission were associated with a higher mortality rate. High CK-MB levels have been associated with decreased lymphocytes and increased inflammation. Furthermore, it was found that smokers and individuals with high blood pressure and geriatric problems were associated with higher CK-MB levels and had pain or pressure in the chest, lasting more than 2-3 minutes and not lasting more than 10 minutes. ⁽²³⁾.

Also, the results showed that there were no significant differences in liver enzymes between the two groups of patients and healthy people.

Since there was no change in transaminase activity or heart disease, the data indicated an increase in ALT and a decrease in AST in patients with high AST levels, which increases the risk of cardiovascular disease and mortality. All things considered, the data suggest a strong independent association between AST and the risk of cardiovascular disease or death. Age, gender, diabetes, obesity, and geographic location can have an influence on the relationship between AST and mortality ⁽²⁴⁾. Although research has focused on the relationship between cardiovascular disease

risk factors and liver enzymes, the links between these two conditions are inconsistent, and only Fraser and his group's study showed that ALT is not associated with the development of stroke and coronary heart disease (CAD).⁽²⁵⁾

The results did not show any significant difference between the levels of sodium ions and phosphorus ions between the two groups. The results show that hypernatremia commonly coexists with cardiovascular disease. Hypernatremia is a reliable predictor of death in these patients⁽²⁶⁾. In contrast to healthy individuals whose salt levels are normal, water retention in the renal collecting duct occurs mostly due to the release of AVP. On the other hand, elevated AVP secretion may theoretically cause heart failure by directly inducing myocardial hypertrophy and worsening systolic and diastolic wall stress⁽²⁷⁾.

The results reached by researcher Arjwan⁽²⁸⁾ and researcher Ramadesikan⁽²⁹⁾, who measured the concentration of phosphorus in patients with heart disease (atherosclerosis), showed that phosphorus did not develop much in patients with atherosclerosis because it is the second most common disease. The increase in this enzyme may be attributed to necrosis that occurs in the heart muscle and arteries, causing the enzyme to be released into the blood circulation. minerals in the body.

It also plays a crucial role in monitoring the body's cells, blood vessel health, energy production, and bone growth.

Hyperphosphatemia is known to contribute significantly to cardiovascular disease, including high blood pressure, atherosclerosis, and cardiac calcification, in people with obviously serious conditions. According to data, high phosphorus levels are not associated with mortality from cardiovascular disease⁽³⁰⁾.

Conclusions:

The results indicated that there were no significant differences in all variables studied between the patients and the healthy group,

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