ASSOCIATION BETWEEN SERUM LEVEL OF VITAMIN D AND LIPID PROFILES IN ATHEROSCLEROTIC PATIENTS WITH TYPE 2 DIABETES

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Abstract

Atherosclerosis is a chronic disease around the world and is the main cause of death risk for patients with atherosclerosis and type 2 diabetes , the study aimed to evaluate the effect of vitamin D and lipid profile in patients with atherosclerosis, the study was conducted on patients referred to specialized clinics in Kirkuk and Cardiology Hospital in Sulaymaniyah for the period from August 2021 to January 2022, the study included sixty samples of men whose ages ranged between 40 and 70 years , distributed into three groups, the first included twenty men with atherosclerosis, the second group included twenty men with atherosclerosis and type II diabetes, and the third group included twenty healthy men with the same age range as the samples , the results of the current study showed a significant decrease of vitamin D in the groups affected by atherosclerosis and diabetes mellitus compared to the control group, and there was a clear increase in the lipid profile such as cholesterol, triglycerides, low-density lipoproteins and very low-density lipoproteins, atherogenic index , except for a decrease in the level of lipoproteins high density and this predicts the risk of atherosclerosis and diabetes, and is considered a diagnostic marker for atherosclerosis in patients.

Keyword : Atherosclerosis , Vitamin D3 , Lipid Profiles , Diabetes Type 2 .

Introduction

Atherosclerosis is a disease that is characterized by the accumulation of lipids, fibrous elements, and calcification within the large arteries. This process is initiated by endothelium activation, followed by a cascade of events, which implies the vessel narrowing and activation of inflammatory pathways leading to atheroma plaque formation. Altogether, these processes result in cardiovascular complications that remain as the leading cause of death worldwide [1]. Cardiovascular diseases (CVD) are a major health concern worldwide. According to the World Health Organization (WHO), Coronary artery disease (CAD), and this disease mainly occurs due to the development of arteriosclerosis, which is the biggest risk factor [2]. Atherosclerotic disease is a chronic vascular inflammation in particular, in the presence of acquired and innate immunity in the body [3], or it is a pathological condition that targets the aorta and the large or medium-sized vessels, especially the cerebral and coronary arteries due to the

accumulation of fat [4]. Atherosclerosis is characterized by a low-grade, chronic inflammatory process that can lead to atherosclerosis and a number of CVDs [5]. Vitamin D, via both genomic and non-genomic pathways, has direct and indirect effects on insulin secretion, β-cell function , and insulin resistance [6]. On the other hand, cardiovascular disease is the most common cause of mortality in diabetes mellitus type 2 . Researchers have confirmed that vitamin D plays an important role in endothelial function, blood pressure control, calcification of the coronary vasculature, increased vascular resistance, and prevention of Cardiovascular disease [7]. The effect of vitamin D on regulation of the lipid profile is one of the proposed mechanisms for the relationship between vitamin D deficiency and CVD. The aim of our study is to determine the association between serum level of vitamin D and lipid profiles, to atherosclerotic patients and including serum concentrations of cholesterol, TG, HDL, LDL, and VLDL in type 2 diabetic patients. The study aims to association between serum vitamin D level and lipid profiles in atherosclerotic patients with type 2 diabetes .

Materials and Methods

Venous blood was collected for men with arteriosclerosis aged between (40-70) years from patients who attended the Specialized Cardiology Center in the city of Sulaymaniyah for the period from (August 2021 to January 2022), who were diagnosed with atherosclerosis clinically and laboratory. Vascular calcification by specialists in the same center, based on the health staff's tests, based on the CT-Scan device, which also gives a picture or assesses the severity of the patient's arterial stiffness level and the study included three groups, the first of which was a control group with 20 healthy men from the disease, the second group included people with atherosclerosis only, and the third group included people with atherosclerosis and type 2 diabetes. The study focused on knowing the extent of the effects on the level of vitamin D and Patients' lipid profile.

The studied samples were distributed according to the following groups:

The first group : control

The group included (20) samples of blood serum from healthy men after making sure that they are in good health and do not suffer from any diseases, their ages ranged between (40-70) years.

The second group : Patients with atherosclerosis

The group included (20) samples of men with atherosclerosis who were diagnosed laboratory and clinically.

The third group : Patients with atherosclerosis and type 2 diabetes

The group included (20) samples of men with atherosclerosis, as well as those with type II diabetes who were diagnosed laboratory and clinically.

Blood Samples:

Blood was taken from the humeral vein by withdrawing (5 ml / sample) and leaving the sample at room temperature (25 °C) for a period of (20 min) for the purpose of coagulation until the blood clotted, then placed in a centrifuge at a speed (3000 rpm) for (15-20) minutes, and the blood serum was withdrawn by means of a micropipette to the eppendrof tubes after dividing them into small samples and serum was frozen at (-20 °C) until biochemical tests were performed, and the information on each sample was

recorded on it , the biochemical measurements include : Vitamin D , Cholesterol , Triglyceride , HDL-C , LDL-C , atherogenic index and VLDL-C was estimated using biolabo Kits according to manufacturer instructions [8].

Statistical analysis

The results were statistically analyzed using the Minitab program . In order to extract the differences between the experimental groups with emphasis on these differences by extracting the standard error (Stander Error) SE Statistical analyzes were conducted according to Duncan were identified the probability level (P≤0.05) .

Results and Discussion

The results of the current study showed a significant decrease at the level (P≤0.05) in the concentration of vitamin D3 in the group affected by atherosclerosis and diabetes mellitus compared with the healthy group, as well as a significant decrease in the concentration of vitamin D3 in the group affected by atherosclerosis compared with the healthy group , and there are no significant differences in the concentration of vitamin D3 when comparing the group affected by atherosclerosis and diabetes mellitus and the group affected by atherosclerosis only, the results of the current study showed a significant increase at the level (P≤0.05) in the concentrations of cholesterol , VLDL-C and LDL-C in the group with atherosclerosis and diabetes, compared with the group with atherosclerosis and the healthy group and a significant increase in the concentrations of cholesterol , VLDL-C and LDL-C in the group with atherosclerosis compared with the healthy group , the results of the current study showed a significant increase at the level (P≤0.05) in the concentrations of triglycerides and atherogenic index in the group affected by atherosclerosis and diabetes compared with the healthy group, as well as a significant increase in the concentrations of triglycerides and atherogenic index in the group affected by atherosclerosis compared with the healthy group and there are no significant differences in the concentrations of triglycerides and atherogenic index when comparing between the group affected by atherosclerosis and diabetes and the group affected by atherosclerosis only , the results of the current study showed a significant decrease at the level (P≤0.05) in the concentration of high-density lipoprotein HDL-C in the group with atherosclerosis and diabetes compared with the healthy group, as well as a significant decrease in the concentration of HDL-C in the group patients with atherosclerosis compared to the healthy group and there are no significant differences in the concentration of high-density lipoprotein HDL-C when comparing the group with atherosclerosis and diabetes and the group with atherosclerosis only, as in the table (1).

Table (1) : Sample specification and studied parameters in the group affected by atherosclerosis and diabetes mellitus and the group with atherosclerosis only and the healthy group of diseases

Sample specification		Healthy	Atherosclerosis	Atherosclerosis and DM
Number		20	20	20
Systolic pressure mm/Hg		118	168	191
Diastolic pressure mm/Hg		78	93	102
Smoking	smokes	3	14	15
	Non moking	17	6	5

BMI Kg/m²	22	31	28
Age (years)	53	54	57
Sex	male	male	Male
Parameters			
Vitamin D ng/ml	14.679 a	5.173 b	4.521 b
Cholesterol mg/dl	c173.2	219.15 b	242.2 a
Triglyceride mg/dl	b 172.625	186.5 a	189.7 a
HDL-C mg/dl	a47.85	31.6 b	29.55 b
LDL-C mg/dl	c98.25	155.4 b	171.1 a
VLDL-C mg/dl	27.1 c	32.15 b	41.55 a
Atherogenic index	3.69 b	6.04 a	6.485 a

The atherosclerotic process begins as an interaction between vascular wall injury, inflammation, endothelial dysfunction, and the recruitment of immune cells for the development of this disease [9]. Vitamin D3 receptors (VDRs) are present in most tissues of the heart and vascular smooth muscle as well as reducing the progression of atherosclerosis, calcification and hypertrophy of the heart [10]. We note the decrease in the levels of vitamin D3 in the two groups with atherosclerosis, which is attributed to the fact that low levels of the vitamin are closely related to an increased risk of atherosclerosis and cardiovascular diseases , the low level of vitamin D may be due to several factors, but the main reasons for its low level are insufficient exposure to sunlight as well as insufficient intake of the vitamin from its food sources. There are a variety of factors that limit the skin's production of vitamin D, including increased skin pigmentation and topical application of sunscreens that will absorb solar UV photons, thus significantly reducing vitamin D production in the skin by up to 99%. Obesity with low vitamin D, as the high content of body fat acts as a reservoir for fat-soluble vitamin D and increases its absorption, thus limiting its low bioavailability. [11]. Several studies have confirmed the relationship between vitamin D deficiency and an increased risk of cardiovascular disease in DM2 diabetic patients [12]. In addition, type 2 diabetes can actually lead to the development of atherosclerosis or accelerate its progression. Elevated glucose level, dyslipidemia, and other metabolic changes that accompany disease progression are principally involved in the pathogenesis of atherosclerosis at nearly every step of the atherosclerotic process [13]. In addition, a deficiency of this vitamin (Vitamin D) increases adhesion molecules or activates the inner lining of the artery wall, as well as increases the production of endothelial nitric oxide, and a deficiency in vitamin D levels can, at the same time, lead to oxidative stress and increased inflammation as well as expression About specific immune cells that play a pivotal role in the development of atherosclerosis in the endothelium of blood vessels, such as monocytes and macrophages [14]. Dyslipidemia and diabetes are common risk factors for atherosclerosis, with elevated circulating LDL-cholesterol or total cholesterol independently and positively associated with the prevalence of atherosclerotic peripheral vascular disease [15]. These significant changes in the levels of lipid profile variables are among the characteristics of dyslipidemia that accompany the emergence and development of arterial sclerosis, which leads to cardiovascular disease, being one of the most common risk factors, The researchers called the risk of diabetic cardiovascular complications after exposure to

high levels of glucose for a certain period of time the "metabolic memory" or "old effect." One possible mechanism for this effect is the formation of advanced glycation end-products (AGE), which occurs when the blood glucose level is high , as these compounds are not easily metabolized and thus accumulate in patients with a long history of inadequate blood glucose control, this accumulation may accelerate the development of vascular disease in diabetic patients [16].

Conclusions

The statistical study of the correlation showed that vitamin D3 deficiency is inversely related to the levels of lipids in the blood serum of patients in the two groups, and there is a correlation between vitamin D3 deficiency and the incidence of atherosclerosis , atherosclerosis was associated with increased levels of cholesterol, LDL , VLDL, triglycerides and atherogenic index , and a decrease in HDL and vitamin D levels, and it was significantly observed in the sclerosis group with diabetes.

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