



**pure sciences international
Journal of kerbala**



Year:2024 Volume : 1 Issue : 2 ISSN: 6188-2789 Print 3005 -2394 Online

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Rasha Abbas Abdel Hussein, Rehab Jasim Mohammed, Lamia Abdel Karim Darwish, Evaluation of lipid profile, urea and creatinine in hypertensive patients, Pure Sciences International Journal of Kerbala, Vol. 1 No.2, (2024) 49-56



Evaluation of Lipid Profile, Urea and Creatinine in Hypertensive Patients

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PAPER INFO

Paper history:

Received 23 April 2024

Accepted 11 June 2024

Published 30 June 2024

Keywords:

Hypertension, Lipids profile, Hypertension and kidney weakness.

A B S T R A C T

Hypertensive is a common disease that can be dangerous if left untreated. Also, many factors can cause high blood pressure, including high fat content. There is a strong relationship between high blood pressure and kidney weakness, This is because uncontrolled hypertensive is a major reason for chronic kidney disease. This study included 50 patients who were suffering from hypertensive and 40 individuals from the healthy control group. 50 patients who were suffering from high blood pressure, 28 males and 22 females, with ages ranging from 40 to 70 years, participated in this study. They were compared with the healthy group. The parameters measured in these groups were cholesterol and triglycerides and (LDL, HDL, VLDL) and urea and creatinine. The results of this study showed a significant difference when comparing the data of patients with high blood pressure with the group of healthy people. It is noticed that most of the analyzes were higher than the normal limit, which included cholesterol and triglycerides, (LDL, HDL, VLDL), urea, and creatinine in patients with hypertensive. The P value was in $\leq (0.0001)$.

1. INTRODUCTION

Blood pressure is the force with which blood pushes against the walls of blood vessel [1,2]. This force changes, and it is the highest when the heart contracts to pump blood to the body (systolic blood pressure), and decreases during a period when the heart stops contracting (diastolic blood pressure) [3]. Therefore, the blood pressure measurement result consists of two numbers, for example 130 over 85 mmHg. Changes in these numbers have a "normal range" [4]. Hypertensive is an increase in one or both of these numbers above the upper limit of normal [5]. Accordingly, hypertensive is a condition in which there is an increase in the force with which blood pushes against the walls of blood vessels as it flows to reach the body's organs [6]. The heart, which requires it to exert more effort to pump blood into arteries with high pressure. Consequently, the strength of the heart weakens, and the heart muscle swells and becomes fibrous [7]. Blood vessels face a high force that exerts internal pressure on their walls, causing damage to their structure, decreased elasticity, and increased stiffness [8]. Organs of the body that receive blood with a high impulse force damage their anatomical structure and

impair their functional efficiency [9]. High triglycerides and hypertensive occur as a result of the accumulation of fats on the walls of blood vessels and arteries, causing them to narrow, impeding blood circulation, and causing high blood pressure [10]. Hypertensive due to triglycerides affects the blood vessels and causes damage, which increases the effort on the heart muscle and leads to many complications. Many chronic diseases are linked to each other, and their diagnosis usually coincides at the same time, as high cholesterol is linked to many heart and arterial diseases, especially hypertensive [11,12]. The high blood pressure and cholesterol have a close relationship on many levels. High blood pressure often occurs because of the high levels of cholesterol [13]. Likewise, high blood pressure, individually, is a risk factor that increases the chance of developing heart disease, and the presence of these two factors together at the same time doubles the risk of developing heart disease [14,15]. The risk is still existant even if cholesterol and blood pressure levels are relatively slightly high since the presence of both causes damage to blood vessels and weakens the heart muscle more quickly [16,17].

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2. METHODS

This study was conducted in the Department of Internal Medicine Consultation Clinic at Imam Hussein Teaching Hospital in Karbala Governorate. The study included 40 healthy people and 50 patients suffering from hypertensive. The a greet of the patients and healthy included were 40-70 years. The study extended from October 2023 to February 2024 and included information (name, age, gender, height, weight, duration of disease and other diseases, as well as the treatment used). This study measured the percentage of fats in the blood, lipid profile, as well as the percentage of urea and creatinine in the blood in order to determine the efficiency of the kidneys. Samples were collected by taking the patient’s oral consent and withdrawing 5 ml of venous blood and analyzed by kit.

3.STATISTICAL ANALYSIS

The data were analyzed using SAS software and the results were compared by using the least significant difference (LSD) value at the probability level of 0.05 and 0.0001 [18].

4.RESULTS

TABLE 1.Comparison of the lipid profile, which covers cholesterol, triglycerides, LDL, HDL, and VLDL, as well as urea and creatinine, between patients and the control group.

Parameter	Subject	Means ± S.D	P value
Age(years)	Patient	11.5 ± 0055.	N.S
	control	52.00 ± 6.30	
Cholesterol(mg/dl)	Patient	10.55 ± 00.197	0.0001
	control	69.18 ± 48.132	
Triglycerides(mg/dl)	Patient	88.73 ± 73.175	0.0001
	control	19.22 ± 11.97	
VLDL(mg/dl)	Patient	72.14 ± 93.34	0.0001
	control	22.5 ± 73.19	
LDL(mg/dl)	Patient	06.68 ± 61.196	0.0001
	control	01.39 ± 57.77	
HDL(mg/dl)	Patient	47.6 ± 62.40	0.0001
	control	21.36 ± 37.76	
Creatinine(mmol/L)	Patient	41 ± 0.880.	0.0001
	control	27 ± 0.700.	
Urea(mmol/L)	Patient	33.11 ± 27.33	0.0001
	Control	66.5 ± 68.22	

TABLE 2. Comparison of the lipid profile, which contains cholesterol, triglycerides, LDL, HDL, and VLDL, as well as urea and creatinine, between male and female patients.

Parameter	Subject	Means ± S.D	P value
Triglycerides (mg/dl)	Man	07.79 ± 26.173	0.0001
	Woman	44.22 ± 48.103	
Cholesterol(mg/dl)	Man	46.55 ± 68.195	0.0001
	Woman	64.20 ± 05.133	
VLDL(mg/dl)	Man	68.15 ± 21.34	0.0001
	Woman	62.5 ± 26.21	
LDL(mg/dl)	Man	17.67 ± 03.208	0.0001
	Woman	95.37 ± 13.97	

HDL(mg/dl)	Man	19.6 ± 63.38	0.0001
	Woman	26.34 ± 94.59	
Creatinine(mmol/L)	Man	48.0 ± 01.1	0.0001
	Woman	31 ± 0.730.	
Urea(mmol/L)	Man	30.10 ± 73.36	0.0001
	Woman	38.6 ± 47.22	

No.of man=28

No.of woman=22

TABLE 3. Comparison of the lipid profile, which includes cholesterol, triglycerides, LDL, HDL, and VLDL, as well as urea and creatinine, between patients aged 40-55 and the ones aged 56-70.

Parameter	Subject	Means ± S.D	P value
Triglycerides(mg/dl)	40 – 55	34.71 ± 91.164	N.S
	56 – 70	89.76 ± 35.190	
VLDL(mg/dl)	40 – 55	11.14 ± 61.32	N.S
	56 – 70	37.15 ± 61.38	
LDL(mg/dl)	40 – 55	85.67 ± 26.207	N.S
	56 – 70	65.67 ± 20.182	
HDL(mg/dl)	40 – 55	16.7 ± 39.42	0.05
	56 – 70	60.4 ± 23.38	
Cholesterol(mg/dl)	40 – 55	95.61 ± 00.197	N.S
	56 – 70	06.40 ± 00.197	
Creatinine(mmol/L)	40 – 55	40.0 ± 83.0	N.S
	56 – 70	43 ± 0.950.	
Urea(mmol/L)	40 – 55	01.11 ± 60.32	N.S
	56 – 70	02.12 ± 14.34	

TABLE 4. Comparison of the lipid profile, which includes cholesterol, triglycerides, LDL, HDL, and VLDL, as well as urea and creatinine, between patients with high blood pressure only and patients with other diseases.

Parameter	Subject	Means ± S.D	P value
Triglycerides(mg/dl)	patients with Hypertension	47.67 ± 43.161	0.02
	patients with Other diseases	73.80 ± 92.215	
VLDL(mg/dl)	patients with Hypertension	32.13 ± 00.32	0.03
	patients with Other diseases	66.15 ± 53.42	
LDL(mg/dl)	patients with Hypertension	51.63 ± 02.176	0.01
	patients with Other diseases	19.53 ± 03.248	
HDL(mg/dl)	patients with Hypertension	06.6 ± 25.40	N.s
	patients with Other diseases	35.7 ± 15.41	
Cholesterol(mg/dl)	patients with Hypertension	86.52 ± 86.184	0.01
	patients with Hypertension		

	patients Other diseases	12.51 ± 08.229	
Creatinine(m mol/L)	patients with Hypertensio n	28.0 ± 79.0	0.04
	patients Other diseases	56 ± 0.061.	
Urea(mmol/L)	patients with Hypertensio n	87.10 ± 17.31	0.05
	patients Other diseases	86.10 ± 46.38	

* patient’s Other diseases: diabetes, kidney disease, high lipid profile.

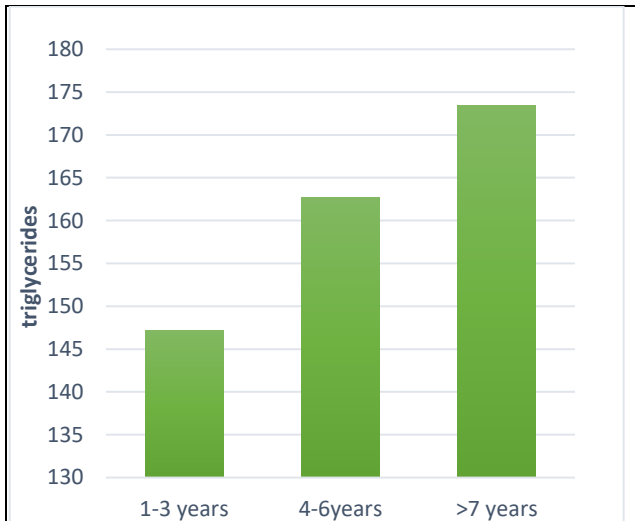


Figure 1. There ration between duration of hypertension and the level of triglycerides.

The relationship between triglycerides in patients with hypertension and the duration of their disease, as they were divided into 1-3 yrs, 4-6 years, and older than 7 yrs. The measurement revealed an increase in the percentage for the the duration of illness in patients with hypertension increased.

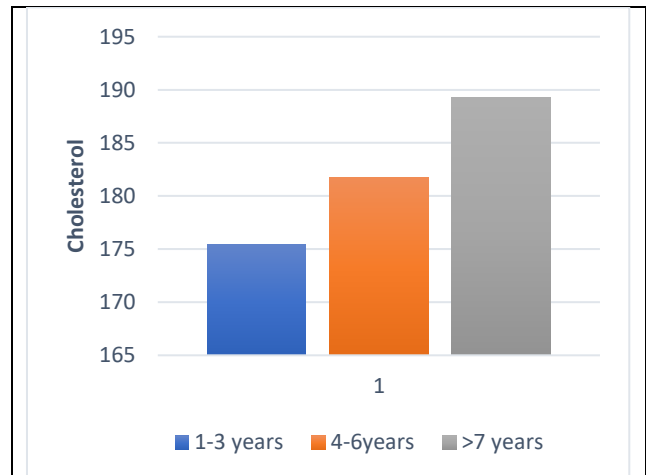


Figure 2. There ration between duration of hypertension and the level of Cholesterol.

The connection between Cholesterol in patients with hypertension and the length of their sickness as they were classified into 1-3 yrs, 4-6 yrs, and older than 7 yrs. The assessment show an increase in the Proportion as the length of illness in those with hypertension escalated.

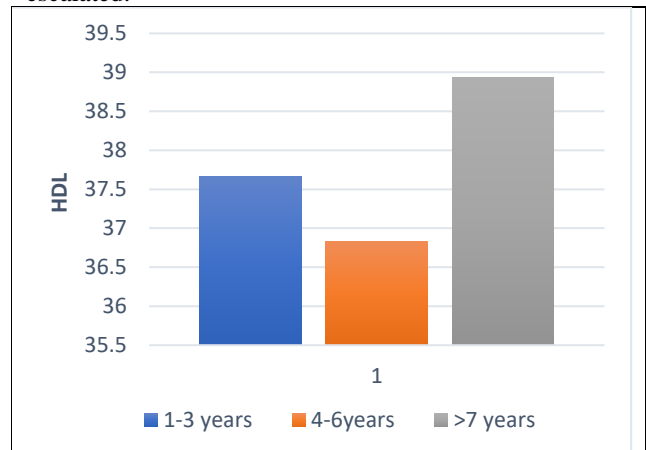


Figure 3. There ration between duration of hypertension and the level of HDL.

The connection between HDL in individuals with hypertension and the length of their illness, which was separated into 1-3 yrs, 4-6 yrs, and more than 7 yrs. The observation revealed a rise in the proportion over 1-3 yrs, following which the proportion decreased over a period of 4-6 yrs and then increased again over a period of more than 7yrs in patients suffering from hypertension..

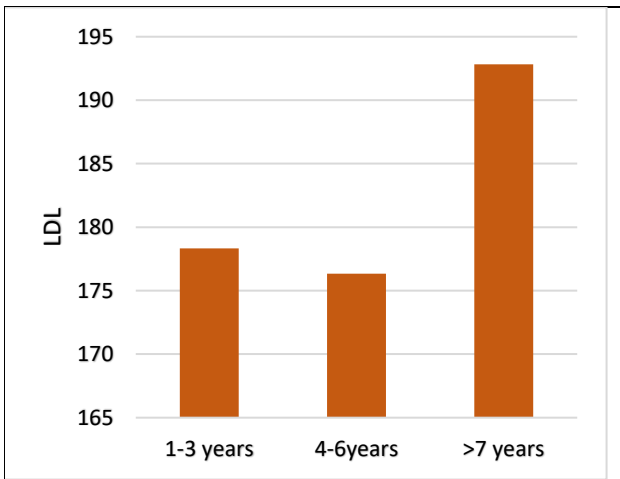


Figure 4. There ration between duration of hypertension and the level of LDL.

The association between LDL in hypertensive patients and the length of their ailment, which was classified as 1-3 yrs, 4-6 yrs, and more than 7 yrs. The assessment revealed a growth in the proportion in 1-3 yrs, followed by a decline in 4-6 yrs, and then a large increase in visits in patients with hypertension in more than 7 yrs.

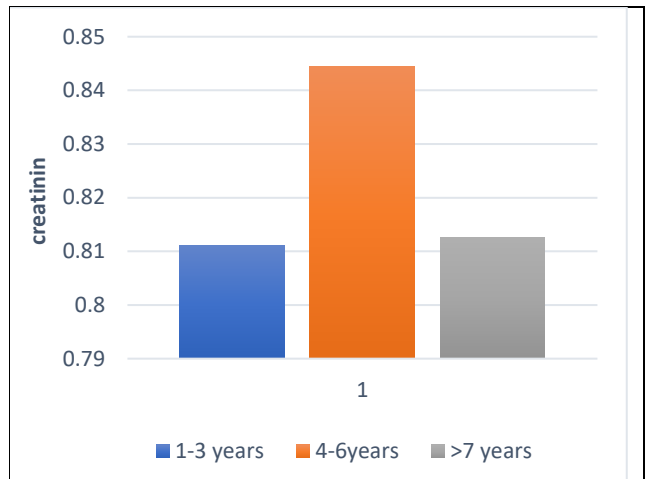


Figure 6. There ration between duration of hypertension and the level of creatinine.

The association between creatinine levels in hypertensive patients and the length of their ailment, which was classified as 1-3 yrs, 4-6 yrs, or more than 7 yrs. The assessment revealed an increase in the percentage over a period of 4-6 yrs in individuals suffering from hypertension.

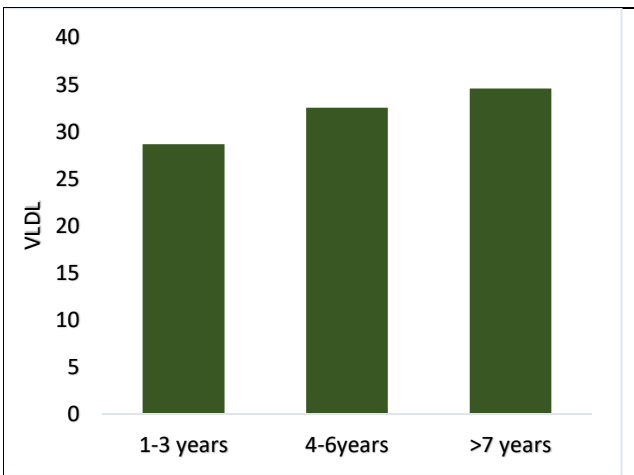


Figure 5. There ration between duration of hypertension and the level of VLDL

The association between VLDL in hypertension patients and the length of their condition, which was classified as 1-3 yrs, 4-6 yrs, and more than 7 yrs. The assessment revealed that the percentage increased with the duration of the ailment in hypertension patients.

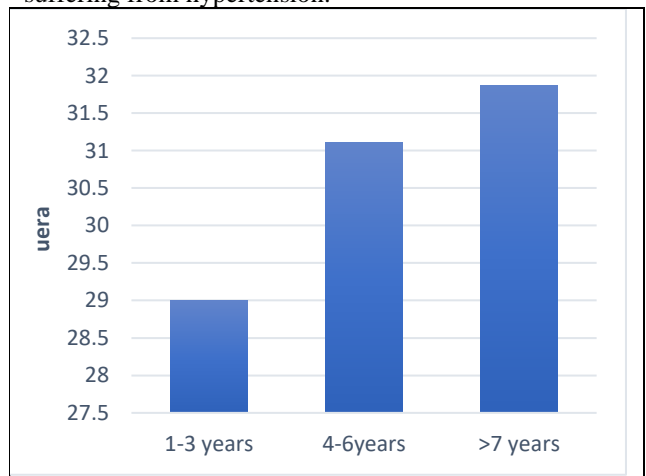


Figure 7. There ration between duration of hypertension and the level of urea.

The relationship between urea in hypertensive patients and the duration of their disease, which was divided into 1–3 years, 4–6 years, and more than 7 years. The measurement indicated an increase in the percentage with increasing duration of the disease in patients suffering from hypertensive.

5.DISCUSSION

The results of Table 1 Figure (2,5) showed a significant difference (P value = ≤ 0.0001) in cholesterol and triglycerides compared with the control group. It also (LDL, HDL, and VLDL). In hypertension individuals, the mean blood levels of triglycerides, total cholesterol, and low-density lipoprotein were considerably higher than their threshold values. Furthermore, according to these findings, aberrant levels of low-density lipoprotein, total cholesterol, triglycerides, and high-density lipoprotein were increasing in hypertension patients [19,20]. It also exposed a noteworthy difference ($p=0.0001$) in the percentage of urea and creatinine when compared with the control group. Patients with hypertensive suffer from high levels of Urea and creatinine result from fluid retention in the body Kidney damage or improper functioning [21].

The results of Table 2 Figure 3 presented a significant difference ($P = 0.0001$) in cholesterol and triglycerides, (LDL, HDL, VLDL) compared between men and women. The outcomes of the current study indicated a substantial difference ($P = 0.0001$) in creatinine and urea levels between men and women. Our findings concur with the findings of two Japanese research studies that have shown a favorable correlation between high blood pressure and HDL values [22]. Similarly, a research comprising over 190,000 French individuals under the age of 55 who had high blood pressure revealed that over 50% of them had dyslipidemia [23]. According to the results of hypertension screening conducted in the United States, dyslipidemia was present in 79% of white male and 65% of white female hypertension patients, which was higher than the percentages observed in black male and female hypertensive patients (57% and 50%, respectively) [24]. Nigerians had a 64% incidence of elevated lipid profiles among hypertension patients [25]. The average prevalence of lipid disorders in patients with hypertension in the Algerian population was 16.1%. [26]. The hypertension population in this study had a high lipid profile prevalence, which was comparable to previous research on the hypertensive population from rural northeastern China [27] and the rural Chinese community in Liaoning Province, China [28].

The results of Table 3 Figure [1,4] indicated that there was no significant difference in the percentage of cholesterol, triglycerides, and (LDL, VLDL) Creatinine, Urea according to the age group between 40-55 and 56-70, only a significant difference in the percentage of HDL ($p = 0.05$). These results agree with other researches showing that age is linked to the increase of blood pressure. They were carried out in both industrialized and developing nations [29, 30]. Furthermore, this investigation showed that in hypertension patients, age was strongly correlated with

serum LDL [31, 32]. It is also supported by studies reporting a direct relationship between age and cholesterol levels [33, 34]. Blood pressure naturally rises with age, possibly as a result of changes in atherosclerotic endothelium cells and increasing atherosclerosis in the blood arteries. Wen & Co. Additionally, Wen & Co stated that atherosclerosis advances with age. Regarding people's age, there is a growing positive correlation between arterial stiffness and blood pressure [35]. The prevalence of atherosclerosis and hypertension rises with advancing age [36, 37].

The results of table 4 Figure [6,7] revealed that there was a significant difference ($p = 0.02$) in triglycerides, ($p = 0.03$) with VLDL, ($p = 0.01$) with LDL and cholesterol, Obesity, diabetes, and dyslipidemia are among the further cardiovascular risk factors that are frequently linked to hypertension. The pathogenesis of hypertension may involve endothelial dysfunction brought on by the presence of cardiovascular risk factors. [38] According to a research by Young et al., [39] insulin resistance has been shown to negatively affect blood pressure in older people and it may have a bigger effect than aging. Additionally, a correlation between plasma insulin concentrations and hypertension was noticed ($r = 0.31$, $p < 0.01$). [40] This study also revealed that hypertension individuals who consumed alcohol had higher average blood TC levels than those who did not. Furthermore, individuals with a smoking habit exhibited aberrant lipid levels. This result goes in line with a Greek research [41]. Worldwide, hypertension is recognized as a significant risk factor for diabetes, renal disease, heart disease, and stroke [42]. The results of the current study showed that there was significant difference in the percentage of ($p = 0.04$) with creatinine, ($p = 0.05$) with urea. as well as the absence of noteworthy difference with HDL compared to patients with other diseases. End-stage renal disease (ESRD) is more common and its incidence is increasing [43]. Renal function will ultimately gradually deteriorate in around one-third of those afflicted [44]. According to worldwide data on the prevalence of hypertension worldwide, in 2005, 20.6% of Indian men and 20.9% of Indian women reported having high blood pressure. By 2025, it is anticipated that these rates would increase to 22.9% and 23.6%, respectively, for Indian men and women [45]. Adequate blood pressure regulation is widely acknowledged to be crucial in avoiding cardiovascular disease and end-stage renal disease (ESRD) and reducing the course of chronic kidney disease (CKD) [46]. Long-term exposure to blood pressure increases, especially in normotensive settings, can cause early kidney injury since the kidneys are the first organ targeted for damage in hypertension [47]. The effect of duration of hypertension increases

the risk and heart disease (Hardening and blockage of the arteries) and kidney disease [48].

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Arabic Abstract

ارتفاع ضغط الدم هو مرض شائع يمكن أن يكون خطيرًا إذا ترك دون علاج. كما أن العديد من العوامل يمكن أن تسبب ارتفاع ضغط الدم، بما في ذلك ارتفاع نسبة الدهون. هناك علاقة قوية بين ارتفاع ضغط الدم وضعف الكلى، وذلك لأن ارتفاع ضغط الدم غير المنضبط هو سبب رئيسي لأمراض الكلى المزمنة. شملت هذه الدراسة 50 مريضاً يعانون من ارتفاع ضغط الدم و 40 فرداً من مجموعة السيطرة الصحية. شارك في هذه الدراسة 50 مريضاً يعانون من ارتفاع ضغط الدم، 28 ذكراً و 22 أنثى، تتراوح أعمارهم بين 40 إلى 70 عاماً. وتمت مقارنتهم مع المجموعة السليمة. تم قياس العوامل في هذه المجموعات وهي الكوليسترول والدهون الثلاثية و LDL، HDL، VLDL واليوريا والكرياتينين. وأظهرت نتيجة هذه الدراسة وجود فرق كبير عند مقارنتها ببيانات المرضى الذين يعانون من ارتفاع ضغط الدم مع مجموعة الأشخاص الأصحاء. نلاحظ أن معظم التحاليل كانت أعلى من الحد الطبيعي والتي شملت الكوليسترول والدهون الثلاثية و (LDL, HDL, VLDL) واليوريا والكرياتينين لدى مرضى ارتفاع ضغط الدم. كانت القيمة $\geq (0.0001P)$
