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# Finding a Correlation between Laminin, Angiogenin, and Some Hormonal and Biochemical Variables in People with High Blood Pressure

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***Abstract:*** The ongoing study aimed to finding the correlation between laminin and angiogenin and a number of hormonal and biochemical variables in people with high blood pressure. The study was carried out by collecting 60 samples from sick people with hypertension, from both sexes. The patients were diagnosed by specialized doctors. Their ages included (25-70) years. The spacmens were collected from the cardiovascular center in Balid general hospital Salah Al-Din who hypertensive patients during the time from 1/10/2023 until 20/12/2023.

In this study evaluate the level of laminin, Angiogenin and some biochemical parameters, including- Antidiuretic hormone, endothelin-1, Lipid profiles (Cholesterol (cho), Triglycerides (TG), Low-density lipoprotein cholesterol (LDL-C), High-density lipoprotein cholesterol (HDL-C) and Very low-density lipoprotein cholesterol (VLDL-C)) and blood electrolytes (potassium and sodium ions), aspartate aminotransferase activity, and body mass index computation and doing correlation between its.

The results showed that correlation between Laminin and Antidiuretic hormone, Angiogenin, endothelin-1, Total cholesterol, Triglycerides, Low-density lipoprotein cholesterol (LDL-C), Very low-density lipoprotein cholesterol (VLDL-C), sodium ions and aspartate aminotransferase activity saturation were negative correlation in the hypertensive patients sample. But laminin with BMI show significantly negative correlation. But laminin with High-density lipoprotein cholesterol (HDL-C) potassium show positive correlation. Also correlation between Angiogenin and Antidiuretic hormone, Laminin, endothelin-1, Total cholesterol, Triglycerides, Low-density lipoprotein cholesterol (LDL-C), Very low-density lipoprotein cholesterol (VLDL-C), High-density lipoprotein cholesterol (HDL-C) and potassium saturation were negative correlation in the hypertensive patients sample. But Angiogenin with BMI, sodium ions and aspartate aminotransferase activity show positive correlation. So we can conclude that finding correlation between the laminin and Angiogenin with some biochemical variable in patients with hypertension.

***Keywords:*** Hypertension Disease, Laminin, Angiogenin, ADH, Lipid Profile, Endothelin-1, Sodium, Potassium, Aspartate Aminotransferase, and Body Mass Index.

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## INTRODUCTION

Blood pressure (BP) is the pressure resulting from the force exerted by the heart to pump blood through the circulatory system, and BP is considered one of the basic vital indicators of life (Yancey *et al*., 2016). As for high blood pressure, it is a hereditary disease known that the level of arterial blood pressure can double the risk of cardiovascular disease in the long term (World Health Organization, 2021). Hypertension is one of the most widespread diseases in the world, depending to the classification of the World Health Organization. It was and still is one of the most fatal diseases to humanity, as the death rate due to its complications reaches (5-7) million people annually, Therefore, studies and research have given great attention and a wide area to the relationship of this disease, Chronic disease with various biochemical variables because it has broad effects on all body functions as a result of causing metabolic dysfunction in various body functions (Benjamin *et al*., 2017; Whelton *et al*., 2018). According to a WHO report, around the world there are about 1.28 billion individual the ages between (30 - 79) who have high blood pressure (Hypertension, 2023). Most people with high blood pressure may not feel any symptoms, but the symptoms that have been identified include headache, blurred vision, chest pain, and other symptoms (Arnett *et al*., 2017). Extremely high blood pressure for long duration of time may be the main risk factor for It causes heart disease (heart attacks and heart failure), stroke, kidney failure and brain bleeding. and a major contributor to dementia, disability, premature death, and healthcare costs (Campbell *et al*., 2020; Fuchs *et al*., 2020).

High blood pressure can be considered one of the most common disorders in the world, as it is the main contributor to premature death, and in 2015 the number of people infected with it was estimated at about 900 million people (Forouzanfar *et al*., 2017). This disease has received attention from global health organizations because it is closely linked to cardiovascular disease and kidney damage (Gabb *et al*., 2016), with high blood pressure increasing dramatically as a person ages, affecting approximately 6% of the population. 18 to 34 years, and this percentage increases significantly to 75% of adults aged 75 years and over (Hussein *et al*., 2019). Hypertension is defined as increased blood flow from the heart through the blood vessels, when the heart works stronger than normal, This makes it a major risk factor for heart disease, stroke and other serious problems (Mancia *et al*., 2013). The amount of pressure is determined by The amount of blood expelled by the heart and the amount of resistance of the arteries to the flow of blood through them. High blood pressure is usually a disease that develops over the years. Despite what was mentioned previously, high blood pressure can be identified early to control or reduce it, and high systolic blood pressure is usually more dangerous. of diastolic pressure. As the effect of its height is directly related to the performance of the aorta (Rivera *et al*., 2019). high blood pressure is a major health problem all over the world, especially in developing countries as it has become a global health concern (Guo, 2016; Jadooa, 2016). High blood pressure is classified into: First; essential hypertension, This type is known as cardiovascular disease and constitutes about 90% to 95% of cases in which blood pressure is high among people who are classified as essential hypertension, which may be One of the reasons for its occurrence is genetic factors in people who have a family history of high blood pressure or early death from heart disease (Muntner *et al.*, 2018). Second; Secondary hypertension, This type represents 10% of cases of high blood pressure, and its causes may be genetic or congenital (Bundy *et al*., 2017).

Laminin (LN): It is a non-collagenous glycoprotein found in the basement membrane of the ECM. It was first discovered and named by Timpl et al. in 1979 (Timpl *et al*., 1979). LN has Important functions include adhesion, migration, cell differentiation, cell growth, and inflammatory response, and it also plays an important role in maintaining of basement membrane structure (Yao, 2017). Several studies have shown that LN is closely associated with cardiovascular disease (Xu *et al*., 2022). (ANG) Angiogenin: Also referred to as RNase 5, it is a small protein consisting of 123 amino acids, which was first discovered at Harvard University in 1985 (Fett *et al*., 1985). ANG is a member of the ribonuclease family. The name angiogenin indicates that it was first identified as a factor that stimulates the formation of blood vessels, a process known as angiogenesis, Angiogenin also interacts with endothelial and smooth muscle cells, leading to cell migration, invasion, proliferation, and the formation of tubular structures (Xu Z *et al*,. 2003).

## MATERIALS & METHODS

Design of the study and Subjects: Sixty samples of the serum were collected from the Cardiovascular center in Balid General Hospital in Salah Al-Din city, this collected from serum sample for hypertensive patients. The time for collecting is from 1/10/2023 to 20/12/2023, and the ages of individual between (25-70) years. Specimens were collected before eating (in the morning) due to has lipid sample and without tourniquet due to presence of electrolytes.

This study includes evaluation of serum Laminin concentration, Angiogenin, Antidiuretic hormone, Endothelin-1, Lipid profiles (Triglycerides (TG) - Total cholesterol (cho) - High-density lipoprotein cholesterol (HDL-C) - Low density lipoprotein cholesterol (LDL-C) and Very Low density lipoprotein cholesterol (VLDL-C) ), Electrolyte such as Sodium (Na) (Burtis *et al.,* 2018) and Potassium (K) (Hillmann *et al.,* 1987), and Aspartate aminotransferase (AST) activity (Ruhi & Everhart, 2012) and calculation of Body Mass Index in according to standard methods.

### Statistical Work

In this study, we used the SPSS V.27 statistical program by Pearson Laboratories test to finding the correlation between the studying sample.

## RESULTS

### Laminin and Angiogenin Correlation in Hypertensive Patients

**The results the correlation of Laminin and Angiogenin with some biochemical variable** obtained from the current study were summarized **in Table-1:**

**Table-1** show significantly negative correlation between laminin with BMI. Also correlation between Laminin and Antidiuretic hormone, Angiogenin, endothelin-1, Total cholesterol, Triglycerides, Low-density lipoprotein cholesterol (LDL-C), Very low-density lipoprotein cholesterol (VLDL-C), sodium ions and aspartate aminotransferase activity saturation were negative correlation. But laminin with High-density lipoprotein cholesterol (HDL-C) potassium show positive correlation.

**Table-1** also show correlation between Angiogenin and Antidiuretic hormone, Laminin, endothelin-1, Total cholesterol, Triglycerides, Low-density lipoprotein cholesterol (LDL-C), Very low-density lipoprotein cholesterol (VLDL-C), High-density lipoprotein cholesterol (HDL-C) and potassium saturation were negative correlation. But Angiogenin with BMI, sodium ions and aspartate aminotransferase activity show positive correlation.

**Table-1:** show correlation between laminin and angiogenin and a number of hormonal and biochemical variables in people with high blood pressure.

**Correlations: Patients**

| | | Laminin | Angiogenin |
|---|---|---|---|
| BMI | R | -0.303* | 0.004 |
| | P | 0.019 | 0.976 |
| | N | 60 | 60 |
| Laminin | R | 1 | -0.134 |
| | P | | 0.308 |
| | N | 60 | 60 |
| Angiogenin | R | -0.134 | 1 |
| | P | 0.308 | |
| | N | 60 | 60 |
| ET_1 | R | -0.232 | -0.087 |
| | P | 0.075 | 0.507 |
| | N | 60 | 60 |
| ADH | R | -0.018 | -0.074 |
| | P | 0.890 | 0.572 |
| | N | 60 | 60 |
| K | R | 0.015 | -0.067 |
| | P | 0.907 | 0.612 |
| | N | 60 | 60 |
| Na | R | -0.045 | 0.108 |
| | P | 0.734 | 0.413 |
| | N | 60 | 60 |
| AST | R | -0.083 | 0.041 |
| | P | 0.528 | 0.758 |
| | N | 60 | 60 |
| Chol | R | -0.111 | -0.098 |
| | P | 0.396 | 0.457 |
| | N | 60 | 60 |
| TG | R | -0.099 | -0.048 |
| | P | 0.451 | 0.716 |
| | N | 60 | 60 |
| HDL | R | 0.092 | -0.025 |
| | P | 0.482 | 0.850 |
| | N | 60 | 60 |
| LDL | R | -0.092 | -0.082 |
| | P | 0.485 | 0.535 |
| | N | 60 | 60 |
| VLDL | R | -0.099 | -0.048 |
| | P | 0.451 | 0.716 |
| | N | 60 | 60 |

## DISCUSSION

The results of the study that correlation of Laminin and Angiogenin with BMI The results, according to Table (1), showed the correlation between Laminin and the body mass index, where it was found that the relationship was significantly negative between the level of Laminin and the body mass index in patients, as the value of the correlation coefficient was -0.303*. But The results, according to Table (1), showed a correlation between Angiogenin and body mass index, where it was found that the relationship was positive between the level of Angiogenin and body mass index in patients, as the value of the correlation coefficient was 0.004. Association of Laminin and Angiogenin with ET-1 according to Table (1), where it was found that the relationship was negative between the levels of Laminin and ET-1 in patients, as the value of the correlation coefficient was -0.232. But the results, according to Table (1), showed the correlation between Angiogenin and ET-1, where it was found that the relationship was negative as the value of the correlation coefficient was -0.087. Correlation of Laminin and Angiogenin with Antidiuretic Hormone (ADH) The results, according to Table (1), where it was found that the relationship was negative between the level of Laminin and antidiuretic hormone in patients, as the value of the correlation coefficient was -0.018 .But the results, according to Table (1), where it was found that the relationship was negative between the level of Angiogenin and antidiuretic hormone in patients, as the value of the correlation coefficient was -0.074. Correlation of Laminin and Angiogenin with Potassium, The results, according to Table (1), It was found that the relationship was positive between the levels of Laminin and potassium in patients, as the value of the correlation coefficient was 0.015. But the results, according to Table (1), where it was found that the relationship was negative between the level of Angiogenin and potassium in patients, as the value of the correlation coefficient was -0.067. Correlation of Laminin and Angiogenin with Sodium. The results, according to Table (1), where it was found that there was a negative relationship between the level of Laminin and sodium in patients, as the value of the correlation coefficient was -0.045. But the results, according to Table (1), where it was found that the relationship was positive between the level of Angiogenin and sodium in patients, as the value of the correlation coefficient was 0.108. Correlation of Laminin and Angiogenin with AST. The results according to Table (1), where it was found that there was a negative relationship between the level of Laminin and AST in patients, as the value of the correlation coefficient was -0.083. But the results according to Table (1), where it was found that the relationship was positive between the level of Angiogenin and AST in patients, as the value of the correlation coefficient was 0.041. Correlation of Laminin and Angiogenin with Total Cholesterol. The results, according to Table (1), where it was found that there was a negative relationship between the level of Laminin and total cholesterol in patients, as the value of the correlation coefficient was -0.111. But the results, according to Table (1), where it was found that the relationship was negative between the level of Angiogenin and total cholesterol in patients, as the value of the correlation coefficient was -0.098. Correlation of Laminin and Angiogenin with Triglycerides. The results, according to Table (1), It was found that there was a negative relationship between the level of Laminin and triglycerides in patients, as the value of the correlation coefficient was -0.099. But the results, according to Table (1), where it was found that the relationship was negative between the level of Angiogenin and triglycerides in patients, as the value of the correlation coefficient was -0.048. Binding relationship of Laminin and Angiogenin with high-density lipoprotein. The results, according to Table (1), where it was found that the relationship was positive between the level of Laminin and high-density lipoprotein in patients, as the value of the correlation coefficient was 0.092. But the results, according to Table (1), where it was found that the relationship was negative between the level of Angiogenin and high-density lipoprotein in patients, as the value of the correlation coefficient was -0.025. Correlation of Laminin and Angiogenin with Low Density Lipoprotein. The results, according to Table (1), It was found that there was a negative relationship between the level of Laminin and low-density lipoprotein in patients, as the value of the correlation coefficient was -0.092. But the results, according to Table (1), where it was found that the relationship was negative between the level of Angiogenin and low-density lipoprotein in patients, as the value of the correlation coefficient was -0.082. The correlation of Laminin and Angiogenin with very low density lipoprotein. The results, according to Table (1), it was found that the negative relationship between the level of Laminin and very low-density lipoprotein in patients was found, as the value of the correlation coefficient was -0.099. But the results, according to Table (1), It was found that the relationship was negative between the level of Angiogenin and very low-density lipoprotein in patients, as the value of the correlation coefficient was -0.048. Note: discussion without references due to not find any study that examined the correlation between laminin and angiogenin with these biochemical variables in the hypertensive patients.

## CONCLUSION

Based on the results of this study conducted on blood pressure patients, it can be discussed that the presence correlation between laminin, angiogenin, and some biochemical variable in the hypertensive patients.

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