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The Effect of Some Hormones and Immune Indicators (Renin, Angiotensin 1, Aldosterone, and Osteopontine) in Patients with Hypertension and Diabetes, Male and Female

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Abstract

This study was conducted on patients with hypertension and diabetes of both sexes in Salah al-Din Governorate. The study started from the beginning of December 2019 until the first of March 2020, and the study included 90 people divided into three groups. Blood samples were collected from the patients and healthy subjects and then serum was separated for subsequent tests.

This study aimed to obtain more clarification of some hormonal and immune changes in patients with hypertension and diabetes, and to know the effect of this increase on the changes in the concentrations of some hormones such as Renin, angiotensin-1, and Aldosterone, as well as studying the role of the immune marker osteopentin.The results of the study showed a "high significant increase ($p \leq 0.01$) in the concentrations of the hormones Renin, angiotensin-1, and aldosterone in the blood serum of groups of hypertensive, hypertensive and diabetic patients compared with the control group. No significant differences were found in the concentration of the immune index. Osteopontine among all groups of hypertensive, hypertensive and diabetic patients, and of both sexes, compared with the control group.

Keywords : Hypertension, Renin, Aldosteron, Osteopontine, Diabetes

1- Introduction

Hypertension: is the strength of blood pressure against the walls of the arteries. High blood pressure usually does not show symptoms, but it may cause serious problems, such as heart and kidney disease and diabetes [1]. Hypertension is one of the most important causes of cardiovascular diseases, CVD is the main cause of death worldwide, and there is a clear increase during the year 2020 in the number of deaths due to Hypertension [2]. Hypertension is classified as either primary hypertension or secondary hypertension. About 90-95% of cases are classified as "primary hypertension", which means high blood pressure without a clear medical condition causing it [3] and other conditions caused by the influence of the kidneys, heart arteries or the endocrine system that cause the remaining cases of hypertension. Pressure, which constitutes 5-10% of cases (secondary hypertension) [4].The three regulators (renin, angiotensin, and aldosterone) are the main controllers for regulating normal blood pressure, aldosterone causes sodium reabsorption in the kidney tubules, which is accompanied by the return of fluids to the body through the kidney, which leads to an increase in fluid volume and in this way, the perfusion

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stability of the kidneys will continue. [5]. That gender differences in components and actions of the resonance-angiotensin system have also caused conditions closely related to metabolic function including aging [6], cardiovascular and kidney disease [7], and hypertension [8].

2- Materials and methods

2-1- Samples collection / The study included (90) randomly selected samples belonging to the control group and patients with high blood pressure only and patients with high blood pressure and diabetes whose ages ranged from both sexes (30-70 years), where samples were collected from Health centers in (Al-Qadisiyah region, Al-Alam district, and Samra district). Blood samples were obtained from the humeral vein in a volume of (10ml) by means of a medical syringe in the early morning hours (Fasting) with taking some information concerning each of them, as the blood samples were placed in test tubes containing silicone, and left in a water bath at a temperature of (37)). It was then separated in a centrifuge at a speed of 3500 cycles for 15 minutes to obtain blood serum, where it was placed in the Abendorf test tubes after being divided into 0.5 ml in each tube, then the samples were preserved at a temperature.(20-) M and all the information was recorded on it until it was used. After that, hormonal and biochemical tests were conducted in the consulting office of the College of Science / University of Tikrit.

2-2- Distribution of the studied samples into three groups:

- The first group: patients with high blood pressure and diabetes of both sexes included (36) persons whose ages ranged between (30-70) years.

- The second group: patients with high blood pressure only of both sexes and their number (36) persons, their ages ranged between (30-70) years.

- The third group: the control group of healthy males and females included (18) persons whose ages ranged between (30-70) years.

2-3- To estimate the concentration of Renin hormone in the blood serum, the ELISA test kit used the Sandwich-ELISA technique.

2-4- To estimate the concentration of the hormone angiotensin 1 in the blood serum, the ELISA test kit used the Sandwich-ELISA technique.

2-5- To estimate serum aldosterone concentration, the ELISA test kit uses the Sandwich-ELISA technique.

2-6- To estimate the concentration of the hormone osteopentin in the blood serum, the ELISA test kit used the Sandwich-ELISA technique.

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3- Statistical analysis.

The results were analyzed statistically using Analysis of Variance (ANOVA). The arithmetic means of the parameters were compared using Duncan's multiple range test at a significant level ($p < 0.01$) [9].

4- Results and discussion.

4-1- The level of the hormone Renin in blood of hypertensive and diabetic patients (males and females) and hypertensive patients only (males and females).

The results of the current study, shown in Figure (4-1), showed a high significant increase in the level of ($P \leq 0.01$) for the level of the hormone Renin in the blood serum of patients with hypertension and diabetes for both sexes compared with the control group, and a high significant increase at a significant level ($P \leq 0.01$) for the level of Renin in the serum of patients with pressure only and for both sexes compared with the control group. No significant differences were observed in the Renin level between the two patients with hypertension and diabetes (males and females) and those with hypertension only (males and females).

Renin hormone works to analyzing proteins and form angiotensin I, which is transformed by another enzyme in the blood into angiotensin II and this causes blood vessels to narrow and thus hypertension [10]. It also affects the glomerular scale of the adrenal cortex and this leads to the secretion of the hormone aldosterone, which in turn causes an increase in the absorption of water by the distal tubules of the nephron into the blood and thus hypertension [11]. Renin secretion from adjacent cells creates a RAAS system, and the three classes of the RAS system can be inhibited by using ACE, DRIs and ARBs to stop the feedback of AngII and suppress Renin secretion from the kidneys [12] which lowers Ang II concentration and promotes vasodilatation of vascular and cardiac tissues. . ARBs and ACE inhibitors can affect the cellular functions of the RAAS system, as they can inhibit fibrosis and reduce inflammatory cellular filtration [12].

The activity of the hormone renin changes with the change in the concentration of sodium in the body, and the sodium stored in macula densa cells, which are cells sensitive to sodium concentrations and are present in the distal tube lumen, so the decrease in the stored sodium concentration increases the release of renin and increases its effectiveness, and that Decreased sodium within the body increases renin release [13]. Accumulating evidence indicates that RAS is also important for glucose homeostasis and energy balance, and that disturbances in this hormonal system are involved in the development of metabolic diseases such as obesity and type 2 diabetes [14].

* The different letters on the columns mean that there is a significant difference in the studied groups at a significant level ($P < 0.01$).

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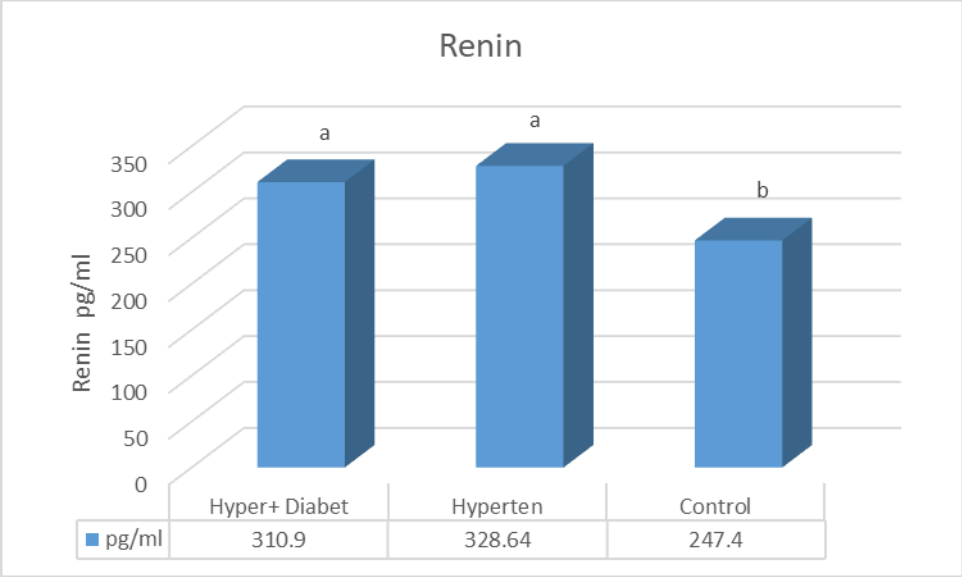

Figure (1-4) the level of the hormone renin in the blood of hypertensive and diabetic patients (males and females) and those with hypertension only (males and females) and the control group (males and females)

4-2- The level of the hormone angiotensin 1 in the blood of hypertensive and diabetic patients (males and females) and those with hypertension only (males and females).

The results of the current study, shown in Figure (4-2), showed that there was a high significant increase in the level of ($P \leq 0.01$) the level of the hormone angiotensin 1 in the blood serum of patients with hypertension and diabetes for both sexes compared with the control group, and no significant differences were observed in the patients' blood serum. Pressure-only patients and for both sexes compared with the control group. No significant differences were observed in the level of the hormone angiotensin 1 between the two disease groups with hypertension and diabetes (males and females) and those with hypertension only (males and females). An increase in circulating renin levels means an increase in the conversion of AGT to AngI, as renin is a catalyst in the formation of AgI, which is later transformed into AngII, which has an active role in endothelial cell dysfunction, insulin resistance, inflammation, and proliferative effects [15]. The association of RAS with the endocrine system is particularly evident through the prominent role of Ang I in diabetes and metabolic syndrome. The frequent association of diabetes with hypertension, retinopathy, nephropathy, and cardiovascular disease has been demonstrated through clinical trials in which RAS inhibitors have significantly reduced the incidence of vascular complications in hypertensive diabetics [10] .

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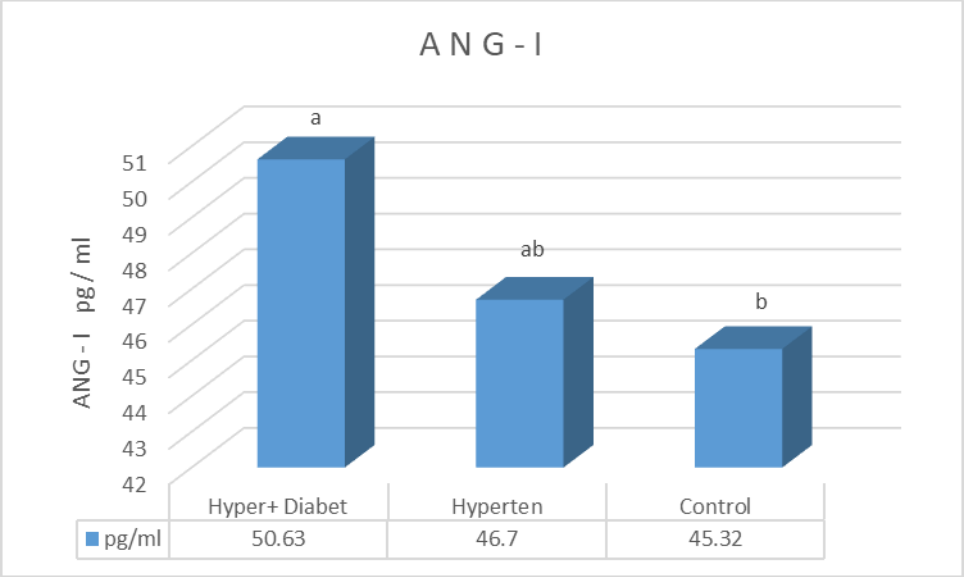

Figure (2-4) the level of the hormone angiotensin 1 in the blood of hypertensive and diabetic patients (males and females) and those with hypertension only (males and females) and the healthy group (males and females)

4-3 - The level of the hormone aldosterone (ALD) Aldosterone in the blood of patients with hypertension and diabetes (males and females) and those with hypertension only (males and females).

The results of the current study, shown in Figure (4-3), showed that there was a high significant increase (P≤0.01) for the level of ALD in the blood serum of patients with hypertension and diabetes for both sexes compared with the control group, and a high significant increase (P≤0.01). The level of ALD in blood serum of hypertensive patients only and for both sexes compared with the control group, and no significant differences were observed in the level of ALD between both groups of patients with hypertension and diabetes (males and females) and hypertensive patients only (males and females) according to the values mentioned in Table 1.) (259.67 ± 24.63), (257.67 ± 20.94) and (221.5 ± 20.68) respectively.

High aldosterone levels are associated with an increase in blood pressure. However, aldosterone concentrations within the normal range can alter blood pressure. Moreover, the ratio of aldosterone to renin, which is an indicator of increased aldosterone, is associated with hypertension, even in patients without elevated absolute aldosterone levels, and the antihypertensive activity of mineralocorticoid receptor blockers supports evidence that aldosterone plays a role in Hypertension in the absence of primary aldosteronism [16]. Pointed out [17] The substance oxalates affect the kidney function, leading to raising blood pressure due to the increase in the effectiveness of the hormone (ALD), which increases the withdrawal of Na and water to increase blood volume and pressure, and it is believed that the reason for the high concentration of the hormone (ALD) due to the effect of this substance on the adrenal gland led to disturbances In their secretion of the hormone ALD, it is believed that this disorder is an increase in the

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secretion of the hormone and the destructive effect of this substance may include the near-glomerular system, which leads to a defect in the Renin-Angictensin system that regulates the secretion of the hormone ALD from the adrenal cortex [18].

It showed [13] that the high levels of aldosterone in chronic kidney patients with hypertension is not limited to its excretion from the adrenergic cortex, but also due to its generation from several other tissues as a result of the activation of pathways within the cytoplasm triggering certain signals in many organs, including the kidney. Aldosterone with cytoplasmic receptors affects the increase in the genetic reproduction of the target genes, and this explains the increase in the secretion of aldosterone, which increases the reabsorption of sodium and water, and the increase in potassium and magnesium deficiency from the renal tubules and thus arterial hypertension to its highest levels.

Independently increased levels of aldosterone are associated with a higher risk of developing type 2 diabetes, with effects particularly noticeable in certain ethnic groups including African Americans and Chinese Americans, who are up to 10 times more likely to develop diabetes if their aldosterone levels are. They have a high [19]. Rodent studies also show a decrease in insulin secretion following systemic aldosterone or DOCA salt administration in Wistar rats [20].

- The different letters on the columns mean that there is a significant difference in the studied groups at a significant level (P <0.01).

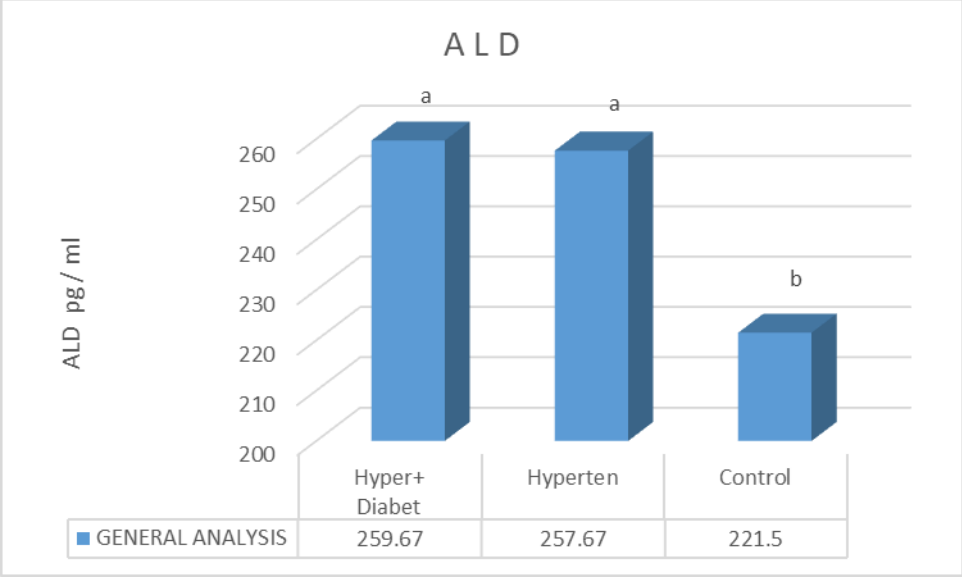

Figure (3-4) the level of aldosterone ALD in the blood of patients with hypertension and diabetes (males and females) and those with hypertension only (males and females) and the healthy group (males and females)

4-4 - The level of osteopontin in the blood of hypertensive and diabetic patients (males and females) and those with hypertension only (males and females).

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The results of the current study shown in Figure (4-4) showed that there were no significant differences in the level of OPN in the blood serum of patients with hypertension and diabetes for both sexes and in the blood serum of patients with hypertension only and for both sexes compared with the control group, and no significant differences were observed in the level of OPN between Both patients with hypertension and diabetes (males and females) and those with hypertension only (males and females) according to the values mentioned in Table 1 (7.069 ± 0.5020), (6.916 ± 0.730) and (7.233 ± 0.663) respectively.

There is great interest in OPN as a biomarker for various disease conditions. Peripheral blood and CSF concentrations of OPN are elevated in patients with multiple sclerosis [21], and neurodegenerative diseases such as Alzheimer's [22]. There is also interest in OPN as a prognostic and prognostic marker for diseases including multiple sclerosis [21], coronary artery disease [23], and many types of cancers [24]. Finally, OPN expression levels are significantly higher in plasma and aortic tissues in hypertension and elevation positively correlate with systolic blood pressure [25]. Indicating that OPN could be used as a clinical marker for vascular remodeling that is induced by hypertension. That treatment with Ang II blockers and statins significantly reduces the level of OPN in plasma [26]. It remains unclear whether the level of OPN in vivo is indeed clinically associated with the development of diabetes complications, as between [27] the level of OPN in plasma significantly increased with age and the progression of diabetic nephropathy.

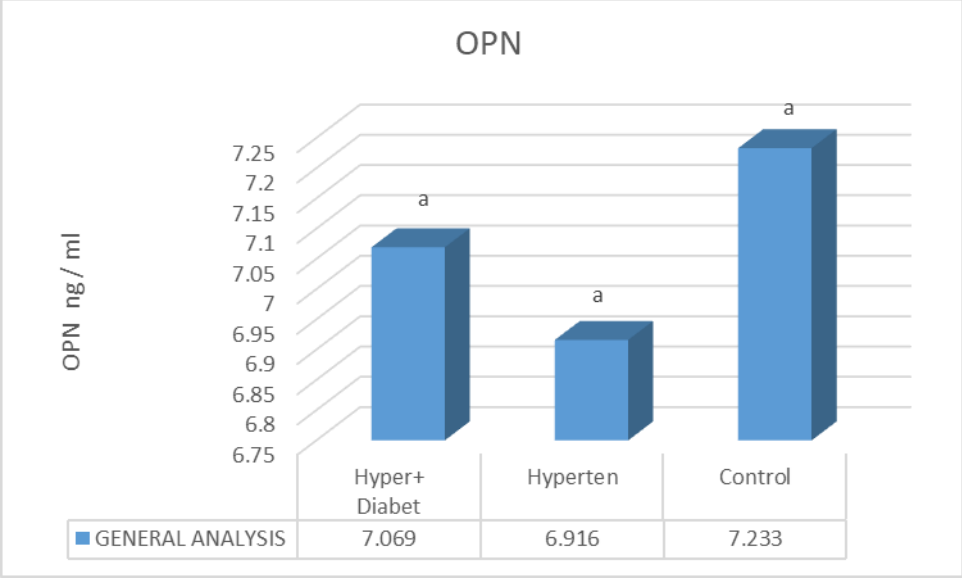

Figure (4-10) the level of ostobutin OPN in the blood of hypertensive and diabetic patients (males and females) and those with hypertension only (males and females) and the healthy group (males and females)

5- Conclusion

There was a significant increase in the level of renin, desterone and angiotensin-1 in hypertensive, hypertensive and diabetic patients of both sexes, compared to healthy

subjects of both sexes. There were no significant differences in the level of osteopentine in hypertensive, hypertensive and diabetic patients of both sexes, compared to healthy subjects of both sexes.

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