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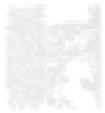
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CORRELATION RELATIONSHIPS OF IMMUN-BIOCHEMICAL INDICATORS OF BLOOD OF PATIENTS WITH ARTERIAL HYPERTENSION, CONSIDERING GENDER

Soliev A.U

Navruzova Sh.I

Bukhara State Medical Institute

Abstract: In recent years, evidence has been accumulating showing the role immune system in the regulation of blood pressure (BP) and cardiovascular risk associated with hypertension. The first line of defense of the immune system involves the innate response and is very fast. The second line of defense, namely adaptive immunity, is characterized by a delayed but highly targeted response. From the point of view of the development (arterial hypertension) of AH, the interaction between these two components of the immune system seems to be essential o'1,4g'

Keywords: hypertension, treatment, correction, position

One of the first identified and best characterized cytokines in relation to hypertension is IL-17. T-helper cells 17 (Th17) and their pro-inflammatory cytokine IL-17 play a significant role in hypertensive autoimmune diseases and endothelial dysfunction [5,7].

It has been established that excessive production of transforming growth factor- β 1 (TGF- β 1) is involved in the long-term consequences of hypertension, including left ventricular hypertrophy, vascular remodeling and progressive kidney disease [2,6].

Finally, cytokines often have overlapping functions, which presents a challenge in studies targeting individual cytokines to evaluate their role in hypertension and tissue damage. All these circumstances are responsible for the variability in AH improvement due to the suppression of specific cytokines [3].

Purpose of the study:

The study of immuno-biochemical parameters in arterial hypertension, taking into account gender and the development of prognostic criteria for the severity of its course.

Materials and research methods.

120 patients were under observation, of which 30 women and 30 men (group 1) with stage 1 hypertension, 30 women and 30 men (group 2) with stage 2 hypertension. The control group consisted of 30 healthy women (1-control group) and 30 healthy men (2-control group) aged 45-74 years.

All patients underwent clinical, immunological, biochemical, laboratory, anthropometric (weight and height measurements) studies. The results obtained by us during this scientific work were processed using a Pentium-IV personal computer and the Microsoft Office Excel-2012 software package. Methods of variational parametric and nonparametric statistics were used with the calculation of the arithmetic mean parameter (M), standard deviation (σ), standard error of the mean (m), and relative values (frequency, %). The statistical value of significance in the comparative analysis of the mean indicators was assessed by Student's t-test (t). At the same time, the probability of error (p) was determined when checking the normality of the distribution (kurtosis criterion) and the equality of the general variances F by the Fisher criterion. The level of significance at $p < 0.05$ was taken as statistically significant. Information was considered reliable provided that $t \geq 2$, and $P < 0.05$. Correlation analysis was carried out using the Spearman (R_s) and Pearson (r) methods. Communication criteria were assessed using the Chaddock scale: $0.1 < r < 0.3$: weak; $0.3 < r < 0.5$: moderate; $0.5 < r < 0.7$: noticeable; $0.7 < r < 0.9$: high; $0.9 < r < 1$: very high.

Exclusion criteria from the study were myocardial infarction, type 1 diabetes mellitus, unstable angina pectoris, pheochromocytoma, atrial fibrillation, acute cerebrovascular accident, dyscirculatory encephalopathy, urolithiasis, cholelithiasis, bronchial asthma, COPD.

Results and its discussion.

To determine the indicators of the severity of hypertension in comorbidity and taking into account gender, it became necessary to study the relationship between immunological and metabolic blood parameters in patients of the examined group. As a result of the correlation analysis of blood biochemical parameters and growth factors in men of the 1st group, a high strong positive relationship of total cholesterol with insulin-like growth factor (IGF-I) ($r = 0.67$) and with procalcitonin (PC) ($r = 0.67$) was revealed.), progesterone with transforming growth factor (TGF- β 1) ($r = 0.43$), testosterone with AST ($r = 0.42$). And also at the same time, an average positive relationship was revealed between LDL and IGF-I ($r = 0.39$), between TG and TGF- β 1 ($r = 0.33$), between PC and TGF- β 1 ($r = 0.39$) (fig1.).

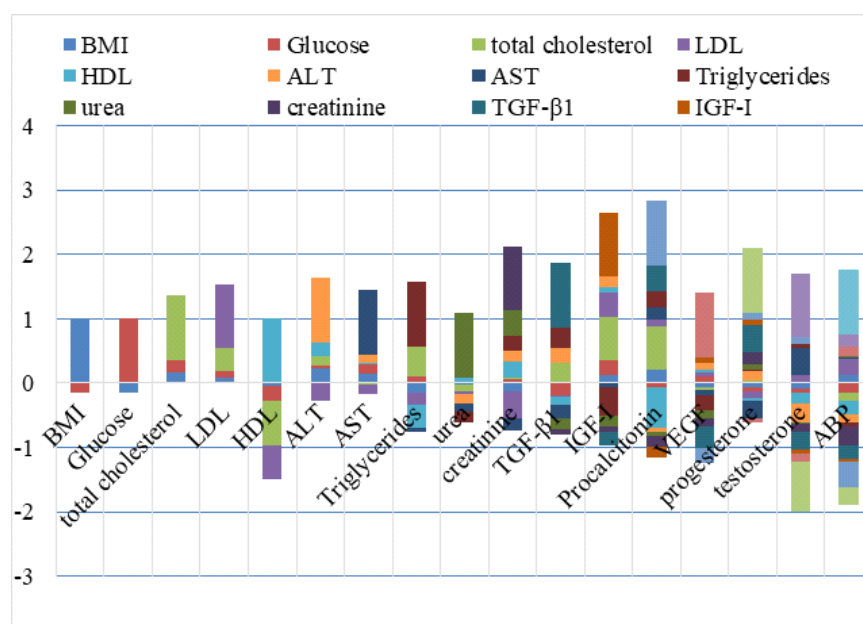


Figure №1 Interrelation of immunobiochemical parameters of blood in 1-degree AH in men

Attention is drawn to the presence of a weak positive relationship between the level of ABP and testosterone ($r = 0.20$), between TG and PC ($r = 0.26$), between TGF- β 1 and ALT ($r = 0.24$), between HDL and creatinine ($r = 0.24$), LDL and ABP ($r = 0.26$), between TGF- β 1 and total cholesterol ($r = 0.30$), between blood glucose and IGF-I ($r = 0.22$). The established positive relationships between the studied parameters show the dependence of the course of hypertension on the state of lipid metabolism and androgen synthesis. Immunological growth factors and damage are markers of the severity of hypertension in men with grade 1 hypertension.

PC as a damage factor in AH in men of the 1st group showed a negative relationship with HDL ($r = -0.62$), an average negative relationship with the ABP level ($r = -0.39$), a weak negative relationship with VEGF ($r = -0.23$).

TGF- β 1 in men with 1-degree AH has negative associations with vascular endothelial growth factor (VEGF) ($r = -0.34$), testosterone ($r = -0.28$) and IGF-I ($r = -0.21$), which allows predicting the outcome of hypertension by its levels in the blood.

The established relationships between the studied growth and damage factors and lipid metabolism indicators prove the contribution of the metabolic syndrome and the development of a bacterial infection in the formation of AH in men. A high positive relationship between the synthesis of progesterone and TGF- β 1 ($r = 0.43$), testosterone and AST ($r = 0.42$) makes it possible to predict the development of fibrosis and sclerosis of internal organs (heart, kidneys, brain, blood vessels) in AH in men.

In men with 2-grade AH, a high positive relationship between TGF- β 1 and HDL ($r = 0.53$) and ABP with VEGF ($r = 0.42$) was found. Therefore, a positive relationship has been established between VEGF and the degree of ABP in men with 2-degree AH. At the same time, the higher the ABP level, the more VEGF increases, which is proved by the presence of a high positive relationship between them - $r = 0.42$. There is such a positive relationship between VEGF and LDL ($r = 0.36$) (Fig. 2).

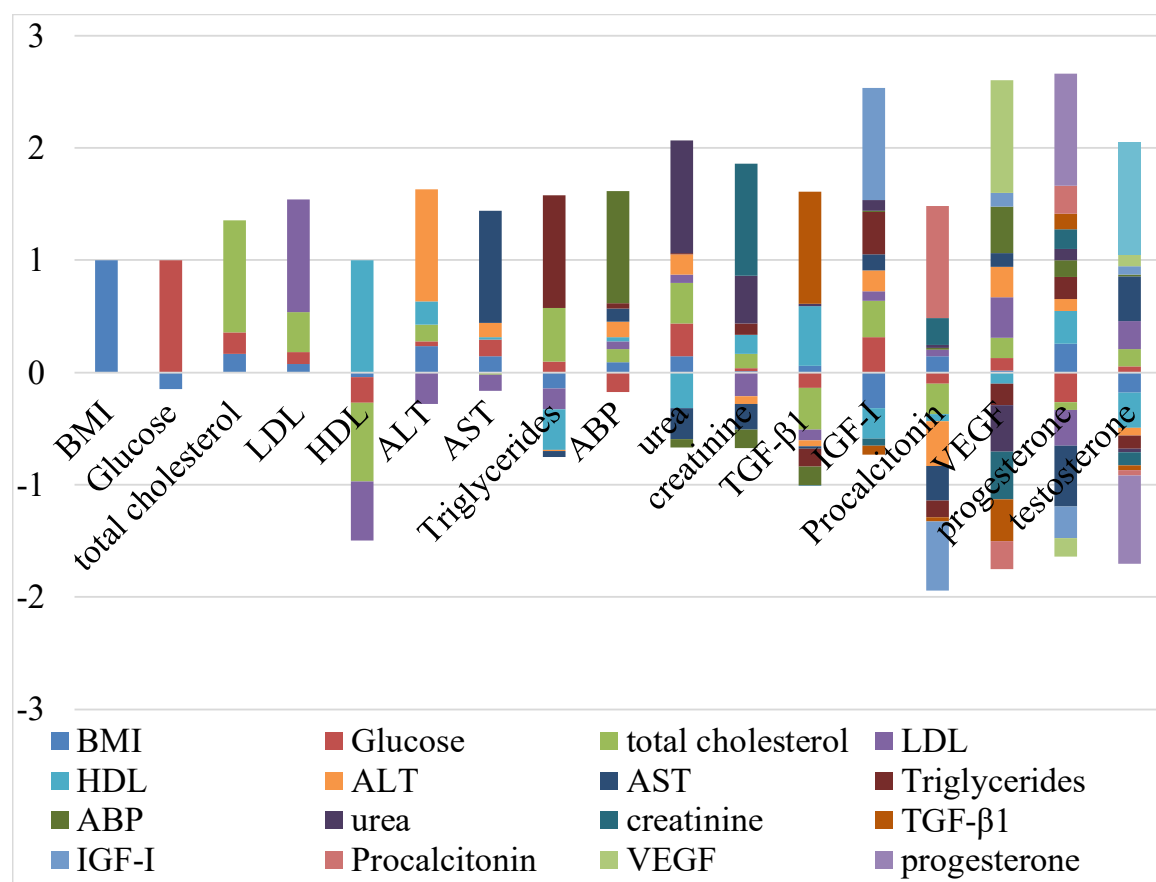


Figure 2. Correlation of immuno-biochemical parameters of blood in 2-degree AH in men

The study revealed a high negative association between PC and IGF-I ($r = -0.61$). At the same time, an increase in the level of PC is accompanied by a decrease in insulin-like factor (IGF-I) in the blood. Therefore, due to the high negative association between PK and IGF-I ($r = -0.61$) and the weak negative association between PK and VEGF ($r = -0.25$), one can judge the nature of inflammation of the vascular wall.

In the course of studying the correlation relationship, its distinctive aspects were obtained in relation to the parameters of urea and creatinine in the blood in men, depending on the degree of hypertension. High negative associations of VEGF with blood urea and creatinine levels were found, $r = -0.42$ and $r = -0.43$, respectively.

Such a negative relationship between VEGF and TGF- β 1 ($r = -0.38$) makes it possible to determine the phases of inflammation and predict the outcome of hypertension. In the acute phase of immunological inflammation increases VEGF in the blood, and an increase in TGF- β 1 confirms the phase of sclerosis of the blood vessels of the internal vital organs (brain, heart and kidneys).

For a comparative assessment of the relationship between the studied blood parameters, taking into account gender, a study was conducted in women with AH of 1-2 degrees. As a result, it was found that the state of metabolism of carbohydrates and lipids is important in the regulation of blood pressure. The severity of hypertension depends on the level of LDL, an increase in the level of which is accompanied by an increase in the synthesis of VEGF. At the same time, age-related hormonal dysfunctions against the background of concomitant diseases are of great importance.

The calculation revealed a negative high relationship between BMI and PC ($r = -0.39$), between LDL and creatinine ($r = -0.42$), HDL and VEGF ($r = -0.34$), TGF- β 1 and IGF -I ($r = -0.56$), between progesterone and testosterone ($r = -0.79$).

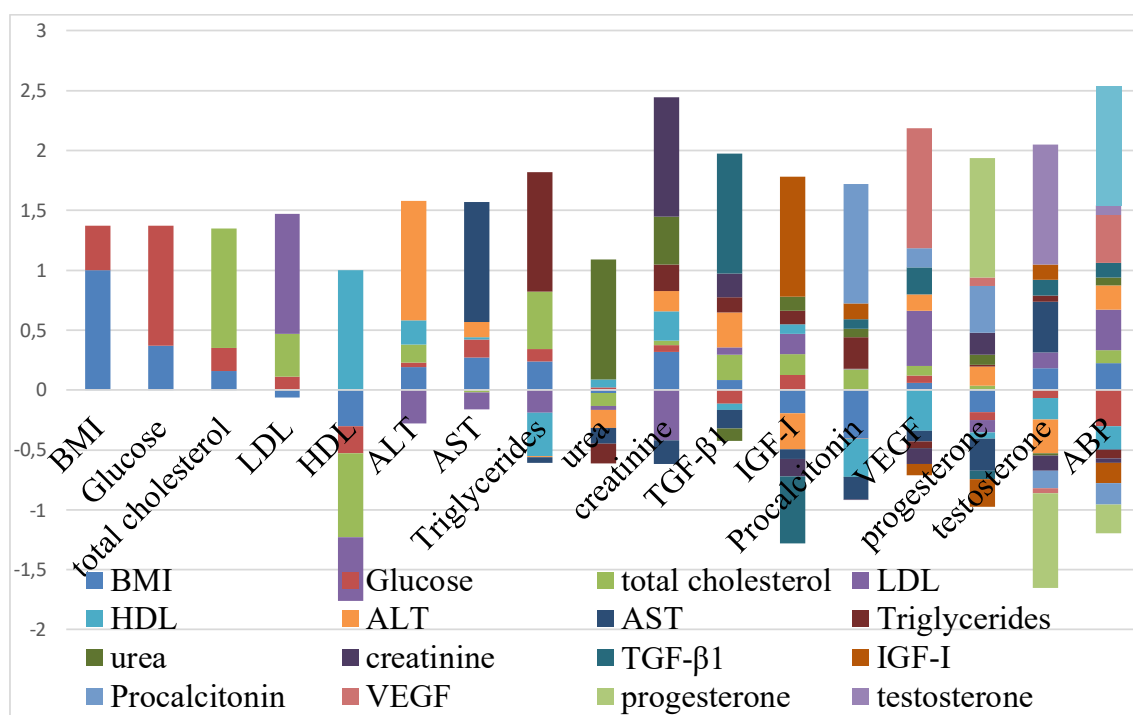


Figure 3. Correlations between immunobiochemical and hormonal blood parameters in women with 1-degree AH

Therefore, BMI in women is not a sensitive indicator of hypertension. In hypertension, indicators of differentiation of the genesis of hypertension are LDL and creatinine.

It is known that IGF-I- as a tropic hormone and an activator of reparative mechanisms for the restoration of the vascular wall, protects and prevents the process of damage to the vascular wall. An increase in the concentration of IGF-I in AH indicates “instability of atherosclerotic plaques” or the development of migrating atherosclerosis, which means an increased risk of an outcome in MI. The high negative relationship between it and TGF- β 1, which we have established, makes it possible to predict the outcome of hypertension already at the initial stage of the disease. So, an indicator of the development of fibrosis-sclerosis and/or LV myocardial hypertrophy in women with 1-degree AH in women is TGF- β 1. An indicator of the risk of MI in women with 1-degree AH in women is IGF-I in the blood.

Depending on the severity of hypertension in women, slightly different results were obtained. In women with 2-degree hypertension, high positive relationships were found between BMI and total cholesterol ($r = 0.44$), BMI and LDL ($r = 0.47$), total cholesterol and urea ($r = 0.36$), total cholesterol and IGF-I ($r = 0.33$), LDL and VEGF ($r = 0.36$), HDL and TGF- β 1 ($r = 0.53$), between AST and testosterone ($r = 0.39$), between TG and IGF -I ($r = 0.37$), between ABP and VEGF ($r = 0.41$), between blood urea and creatinine ($r = 0.43$).

At the same time, a weak positive relationship was also found between BMI and IGF - 1 ($r = 0.29$), BMI and VEGF ($r = 0.27$), glucose and urea ($r = 0.29$), glucose and IGF - 1 ($r = 0.32$), LDL and testosterone ($r = 0.25$), HDL and progesterone ($r = 0.29$), between ALT and VEGF ($r = 0.30$), PC and progesterone ($r = 0.25$), (Fig. 4).

Women with 2-degree hypertension also showed negative high correlations between HDL and total cholesterol ($r = -0.70$), between AST and progesterone ($r = -0.54$), urea and VEGF ($r = -0.42$), creatinine and VEGF ($r = -0.43$), PC and IGF - 1 ($r = -0.61$), progesterone and testosterone ($r = -0.79$).

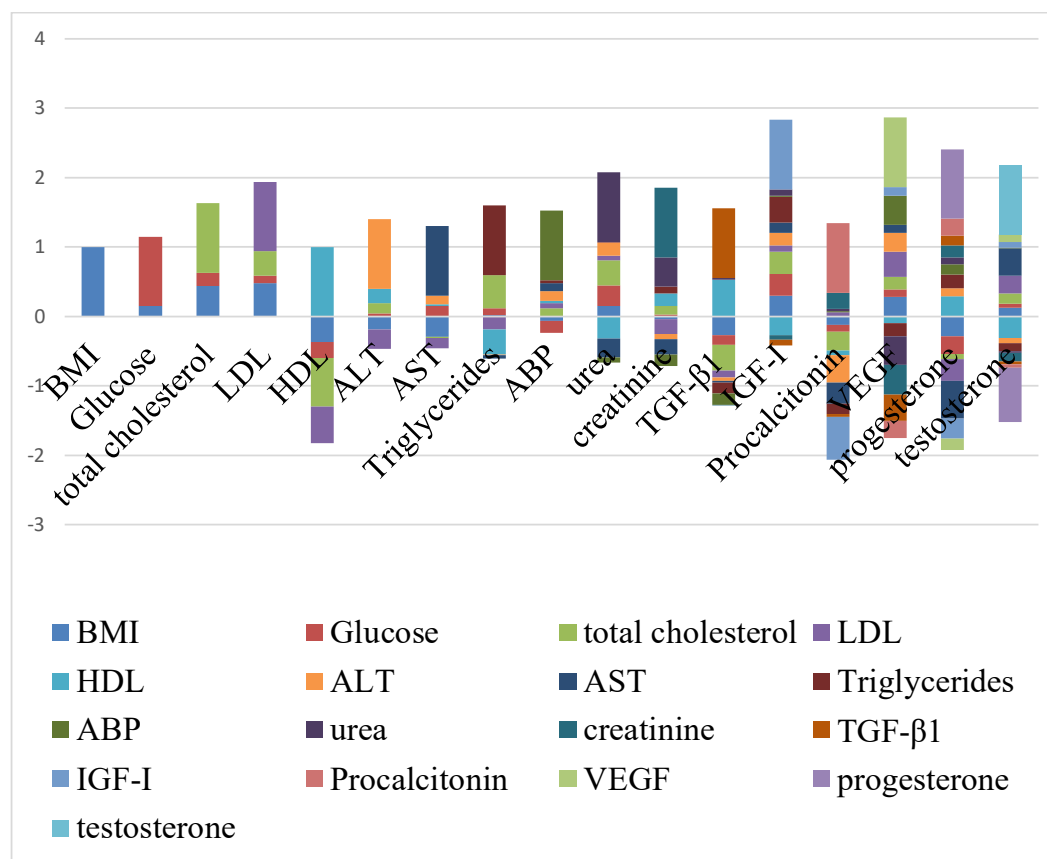


Figure 4. Relationships of immunological growth factors and damage with biochemical and hormonal blood parameters in women with grade 2 AH

And there were also established mean negative relationships between BMI and AST ($r = -0.30$), BMI and progesterone ($r = -0.30$), total cholesterol and TGF- β 1 ($r = -0.37$), LDL and progesterone ($r = -0.32$), HDL and testosterone ($r = -0.32$), ALT and PC ($r = -0.39$), AST and PC ($r = -0.31$), VEGF and TGF- β 1 ($r = -0.38$), progesterone and IGF - 1 ($r = -0.30$).

For TGF- β 1 in women with hypertension, the threshold value is 22.0-25.3 pg/ml. An increase in the above values of TGF- β 1 in AH in women shows a high probability of developing LVH, fibrosclerosis of the vessels of vital organs (heart, brain and kidneys).

Conclusion. Thus, in men in the initial stage of the formation of hypertension, the state of lipid metabolism matters. For the recovery of sick men with 1-degree AH, it is necessary to dynamically study the fractions of lipid metabolism and TGF- β 1. On the basis of the obtained results of the correlation analysis, it was found that TGF- β 1 and IGF - 1 are indicators of severity and outcome in postmenopausal women with 2-degree AH . The threshold value of IGF - 1 for women with hypertension is 123.0-133.2 ng / ml, an increase in its level above the indicated values indicates a high risk of developing complications of hypertension in women, such as acute myocardial infarction, cerebral stroke, acute renal failure (OPN).

A gender analysis of the results obtained led to the conclusion that TGF- β 1, PK, urea and creatinine are indicators of the severity of hypertension in men. The severity of hypertension in men is associated with the degree of uremia, with the development of hemorenal, vasculorenal changes at the level of the blood vessels of the kidneys and the body as a whole.

Therefore, to assess the state of the vessels of the kidneys and other internal vital organs, as well as to prevent complications of hypertension in men, it is recommended to dynamically determine blood TGF- β 1, IGF-I, PK, urea and creatinine in the blood.

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