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Analysis of Clinical and Laboratory Studies of Pregnant Women with Hypertension Conditions

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Abstract The purpose of this study was to study the main clinical and laboratory changes in pregnant women with hypertensive conditions of varying severity. A study was conducted of 104 pregnant women admitted for hospital treatment in the II-III trimester, who were divided into three groups: the first group was 43 pregnant women with severe preeclampsia, the second group was 33 pregnant women with mild preeclampsia, and the third group was 28 women with gestational hypertension. Control group was 107 pregnant women with a physiological course of the gestational period. Characteristic clinical and laboratory changes are given depending on the severity.

Keywords Hypertension, Pregnancy, Sflt1

1. Relevance

Hypertension during pregnancy remains one of the most pressing problems due to the possible development of premature birth, premature abruption of a normally located placenta, the development of fetoplacental insufficiency, intrauterine growth retardation, and the birth of low birth weight children [1-4]. In recent years, these diseases have become one of the most pressing and formidable problems of modern obstetrics, occupying a leading position among the causes of maternal and perinatal mortality [5-9].

A number of scientific studies are being conducted all over the world to improve methods for early diagnosis, prognosis, treatment and prevention of hypertensive complications in pregnant women. In this regard, special attention is paid to the use of modern biochemical, molecular genetics, immunological technologies in medicine and early prevention of possible complications, as well as identifying the causes of the disease [10-13].

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2. Materials and Methods of Research

We conducted a study of 104 pregnant women admitted for hospital treatment in the II-III trimester, who were divided into three groups: The first group was 43 pregnant women with severe preeclampsia, the second group was 33 pregnant women with mild preeclampsia, and the third group was 28 women with gestational hypertension. Control group was 107 pregnant women with a physiological course of the gestational period. The age of the women examined ranged from 19 to 41 years. The average age of pregnant women in the first group was 29.45±0.79, in the second 26.45±0.79, in the third 27.45±0.79, and in the control group – 28.18±0.69 years.

The examination was carried out at the Department of Obstetrics and Gynecology of the Tashkent Pediatric Medical Institute, city maternity complex No. 6, and clinical hospital No. 4, Tashkent city. Genetic studies were carried out at the Department of Molecular Genetics of the Republican Center of Hematology.

The characteristics of the somatic, gynecological anamnesis and obstetric status at the time of examination were studied in the examined women. All women underwent a comprehensive examination, including clinical and laboratory tests: general blood count, biochemical blood test, general urinalysis, Nechiporenko urine test, study of the hemostasis system.

3. Results

When studying a general blood test, a decrease in the amount of hemoglobin in the blood was individually noted (in particular in women with varying degrees of anemia). Whereas in the presence of an inflammatory process, there was an increase in blood leukocytes, and a deviation of the leukocyte formula to the left (due to neutrophils).

However, there were no significant differences in the detailed general blood test in pregnant women in all groups.

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When analyzing the data from a biochemical blood test, no significant differences were also revealed between the groups. A slight decrease in the concentration of total protein was noted in women with severe preeclampsia and amounted to 61.7 + 0.59. Whereas in women with mild preeclampsia and gestational hypertension, this figure was 64.6 + 0.50 64.2 + 0.53, respectively. Also, a slight increase in ALT was noted in women in the first group to 24.2+1.7. In the second group - 18.1+1.4, in the third 19.7+1.4.

The indicators of the hemostatic system in pregnant women in the three groups differed significantly from the indicators in women with a physiological course of pregnancy. A significant decrease in the average platelet count was established in women in the main group with severe preeclampsia relative to healthy pregnant women in the third trimester of pregnancy (161.2±9.6 ×109/l and 193.5±8.7 ×109/l) (P<0.05). When studying platelet aggregation activity, we found that platelet aggregation activity was significantly higher in the main group – 112.7±3.5 compared to the control group – 99.8±3.3 (P<0.05).

When studying aPTT, we found its shortening in the main group to 27.3±1.3 sec, compared with the control group - 35.0±2.07 sec (P<0.01). The PTT indicator in the main group was 15.9±0.2 sec and was significantly different from that in the control group - 14.2±0.53 sec (P<0.01). The concentration of fibrinogen, the main substrate of blood clotting, was slightly higher in pregnant women with preeclampsia – 4.0 ± 0.2 g/l than in women with a physiological course of pregnancy – 3.5 ± 0.17 g/l. In pregnant women with preeclampsia in the third trimester, a statistically significant shortening of the AVR was found - 43.9±0.9 seconds compared to the control group - 51.2±0.2 seconds (P<0.001).

When studying markers of blood activation, a significant increase in RFMC was noted - 6.6±0.4 mg/100 ml in the main group, compared to the control group - 2.98±0.08 mg/100 ml (P<0.001). The presence of markers of intravascular coagulation (IBC) in pregnant women with preeclampsia indicates activation of intravascular thrombus formation similar to the chronic form of DIC syndrome.

Analysis of observations of patients indicates a staged development of platelet hyperaggregation followed by hypercoagulation. This is confirmed by the presence of hyperfibrinogenemia, shortening of AVR and APTT. Evidence of intensification of intravascular coagulation was an increase in the frequency of positive tests for the presence of RFMC.

During the study, the concentration of antiangiogenic protein (sFlt1) was determined in women with physiological pregnancy and in pregnant women in all three groups. The quantitative content of the antiangiogenic protein sFlt1 (soluble receptor fms-like tyrosine kinase-1) in the blood of examined pregnant women with hypertensive conditions and women with a physiological course of pregnancy.

In women in the control group with a physiological course of pregnancy, the quantitative content of sFlt1 was 0.38±1.14 ng/ml, while in women in the main groups (with hypertensive conditions) a significant increase in the amount of sFlt1 was noted. So in the first group there was an average of 10.1+0.23, in the second group with mild preeclampsia 3.3+0.11 ng/ml, in the third group with gestational hypertension 2.4+0.10 ng/ml.

Obvious changes in the concentration of angiogenesis factor were detected in pregnant women in three main groups. It can be summarized that with increasing severity of the hypertensive condition, as well as preeclampsia, the concentration of the sFlt1 protein increases, which can reach a level of up to 10.1+0.23 ng/ml in severe preeclampsia. In patients with severe preeclampsia, the concentration of sFlt1 protein in the blood increases synchronously with an increase in A/D and also with an increase in the level of protein in the urine.

The results of the study indicate that in the third trimester in pregnant women with a physiological course of pregnancy, as well as with preeclampsia of varying severity, changes in the level of angiogenesis factor are noted. During the physiological course of pregnancy in the third trimester, there is a natural drop in the activity of angiogenesis. This is due to the fact that sFlt1 is an inhibitor of angiogenic factors, the synthesis of which is suppressed.

In preeclampsia developed as a result of morphofunctional disorders in the placenta, the synthesis of the sFlt1 protein is enhanced, which leads to the active binding of the angiogenic factors VEGF and PIGF.

An increase in the concentration of the sFlt1 protein during gestation leads to a deficiency of angiogenesis factors, which causes dysfunction of the endothelium of vital organs and contributes to the aggravation of the severity of preeclampsia. From this it becomes clear that the concentrations of angiogenesis factors are directly dependent on the severity of preeclampsia.

The maximum increase in sFlt1 protein concentration is observed in severe preeclampsia. In mild preeclampsia, the concentration of the angiogenic factor changes significantly, but not so pronounced.

4. Conclusions

The study of the vascular-platelet and coagulation parts of the hemostasis system in the third trimester of pregnancy and statistical processing of the data obtained allow us to conclude that women with preeclampsia have hypercoagulation in the coagulation part of the hemostasis and hyperactivity of platelet function and a significant decrease in the number of platelets.

The results of the study showed that determining the level of the angiogenic factor protein sFlt1 in preeclampsia of varying severity is important for predicting pregnancy complications and developing obstetric tactics.

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