Effects of Psychological Stress during Pregnancy on FE3 in Maternal Serum

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Abstract. Objective: to investigate the effect of psychological stress during pregnancy on serum FE3. Method: symptom self-rating scale (scl-90) was used to evaluate the degree of psychological stress of pregnant women. The Free estriol (FE3) level in maternal serum was detected by particle chemiluminescence. Result: serum FE3 levels in pregnant women in the stress group were significantly lower than those in the control group (P < 0.05). Conclusion: psychological stress during pregnancy can reduce serum FE3 level.

1. Introduction

FE3 is a sex hormone synthesized by fetal adrenal gland and liver and ultimately by placenta. In late pregnancy, more than 90% of FE3 comes from fetal placental units, which can directly reflect fetal health and placental function [1-2]. During this special physiological period of pregnancy, women's emotions change frequently and are easily affected by adverse events. These things will produce psychological stress. Psychological stress during pregnancy not only affects maternal health, but also adversely affects fetus [3-4]. We will use scl-90 to evaluate the degree of psychological stress of pregnant women and detect the level of serum FE3 of pregnant women and explore the influence of psychological stress during pregnancy on serum FE3 of pregnant women. Analysing the possible impact of changes in serum FE3 of pregnant women on fetal development.

2. Data

2.1. General information

We selected these. The expectant mothers living in Zhengzhou who were hospitalized in the first affiliated hospital of Henan University of traditional Chinese medicine from November 2015 to February 2017.

2.2. Inclusion criteria

(1) Women of reproductive age, single live fetus, gestational age ≥28 weeks; (2) The pregnant woman was in good health before pregnancy, without chronic disease, major mental illness, or family history...
of mental or intellectual disease;(3) pregnant women who have no history of adverse drug use or pregnancy complications during pregnancy and who are willing to cooperate with this study.

2.3. Informed consent
(1) In August 2015, obtained the approval of ethics review from the ethics committee of the first affiliated hospital of Henan University of traditional Chinese medicine, and obtained the approval of this study from the hospital.

(2) Inform the subjects of the research content of this project, and promise that the research report is only for the purpose of this study and does not involve other benefits.

(3) This study follows the principle of voluntariness and confidentiality, and subjects agree to sign the informed consent.

2.4. Ragers and instruments
No combination of estriol assay kit (Beckman Coulter, Inc), high-speed centrifuge (Thermo), gc-206 radioimmunocounter (sci-tech innovation co., LTD.), and Beckman DXI800 automatic chemiluminescence instrument (Beckman Coulter, Inc).

3. Methods

3.1. Scale evaluation
In the evaluation of psychological stress status of pregnant women. The symptoms of scl-90 in pregnant women were asked to occur during pregnancy and scl-90 was evaluated for pregnant women. According to the scoring criteria, the pregnant women were divided into the stress group with the scl-90 factor score ≥2 and the control group with the factor score < 2

3.2. Detection of FE3 in maternal serum

3.2.1. Collection of blood samples. Before delivery, 3ml of the subjects' peripheral blood was collected at 8am on an empty stomach and placed in a coagulation procoagulant tube. After collecting the blood, put the tube of free estriol to be tested into the refrigerator at 4℃ immediately.

3.2.2. Determination of FE3 level in maternal serum. Using particle chemiluminescence method. Beckan DXI800 automatic chemiluminescence instrument. Detection the serum FE3, in strict accordance with the operating instructions determination: (1) Centrifugal specimens, waiting for machine detection. (2) Automatic instrument identification project. (3) Prepare the reaction cup, sample needle inhalation specimens, reagent needle inhalation reagent. (4) Join the binding material, antibodies and particles, ultrasonic mixing. (5) The estriol competes for the antibody binding site with the binder, and the formed complex binds with the solid antibody. (6) Tempering, and washing away the unbound matter. (6) Chemiluminescence substrates are added and tested specimens.

3.3. Statistical methods
Input all data in Excel, and use SPSS22.0 statistical software package to analyze the data. The measurement data were expressed as mean ± standard deviation (x± s), following normal distribution and meeting homogeneity of variance. The T test of two independent samples was adopted, and the test level was set as α=0.05, P<0.05 indicating statistically significant difference.

4. The results
A total of 160 subjects were obtained. Pregnant women with scl-90 factor score < 2 were divided into the control group, and pregnant women with factor score ≥2 were divided into the stress group. 80 cases in the control group and 80 cases in the stress group respectively. Compared with the control
group, the serum FE3 level of pregnant women in the stress group was significantly lower, and the difference was statistically significant (P < 0.05), as shown in table 1.

Table 1 FE3 levels in peripheral blood of pregnant women in the two groups (x± s, n=80)

| Group          | FE3        |
|----------------|------------|
| The control group | 14.63 + / - 3.55 |
| Stress group     | 11.12 + / - 2.77 |
| F               | 3.602      |
| P               | < 0.001    |

Note: * P< 0.05

5. Discuss
With the acceleration of the pace of life and the increase of emergencies, people face more and more life pressure, physical and mental health is threatened. Especially in mental health problems more prominent. As a special group, pregnant women will not only encounter adverse life events, but also be affected by gestational anxiety. Therefore, pregnant women are easier to have psychological stress reaction. Based on the "DoHaD" theory, it is believed that the fetal period is a key period of growth and development. Any changes in intrauterine environment caused by any physiological and pathological factors during pregnancy will change the order and content of fetal growth and development. This change can permanently affect the offspring, and even have an impact on the long-term health of the offspring [5].

Early, our team [6-7] modified on the sidelines electric shock after the preparation of pregnant rats fear stress model. We using field experiment, the sugar water preference, changes of modern rat tail suspension test evaluation seed. We used Morris water maze of navigation and the space exploration experiment evaluation rats spatial learning and memory ability, for fear of kidney damage in young rats during pregnancy of modern and cognitive development impact study. Results show that compared with normal group, model group, 80 days of age 21 age young rat score of vertical, horizontal scores were lower, the sugar water consumption and preference value is reduced, air prolonged struggle; In the model group, the average escape incubation period was longer at the age of 21 days and 80 days, the stay time at the edge of 20% was longer, the swimming speed was slowed down, and the number of crossing the platform was reduced. The results showed that the general emotional and cognitive development of the model group was slower than that of the normal group. But its mechanism is not clear.

Placenta as a unique endocrine organ connection of maternal-fetal during pregnancy. The Placenta is not only exchange of material with mother and son, at the same time also produces a variety of hormones, enzymes and proteins, hormones produced the placenta, enzymes and other substances to adjust the intrauterine environment. It plays an important role maintaining the pregnancy and fetal growth development [8-9]. During pregnancy, FE3 production is the result of placenta-fetal interaction, and its level depends on maternal-placenta-fetal unit and fetal metabolic function [1]. However, the change of placental function leads to the decrease of serum FE3 level, which further affects the growth and development of the fetus, and even affects the pregnancy outcome. Foreign reports [10-11] in Major depressive disorder women, the level of estriol in their saliva was significantly reduced. When pregnant women are in a high state of anxiety, their serum FE3 levels are reduced. Gu Xiulan[12] ’s study on the effects of serum FE3 and placental prolactin levels on fetal growth development in 315 pregnant women showed that pregnant women with low serum FE3 levels had a significantly increased risk of fetal growth. In addition, pregnant women with low serum FE3 levels are more likely to appear placental abruption, fetal distress and premature rupture of membranes [31].
The results of this study suggest that psychological stress during pregnancy can reduce serum FE3 level. However, low levels of serum FE3 may restrict fetal growth that adversely affect fetal growth and development, and even adversely affect pregnancy outcome. There have been studies [14-15], serum FE3 level can predict preterm labor and improve the diagnostic value of chronic intrauterine distress. Therefore, mental health problems of pregnant women need to be paid attention to. And we should timely guidance and even intervention which can avoid or reduce the adverse impact of psychological stress on maternal mental health and protect the health of offspring. Meanwhile, the determination of serum FE3 should be paid attention to during pregnancy, which has certain clinical significance for the rapid diagnosis of diseases such as placental function and fetal developmental retardation.

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