

## Effect of Folic Acid Level in Pregnant Women Serum on Pregnancy Outcome

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**Abstract:** Objective: To investigate the effect of folic acid level in pregnant women's serum on pregnancy outcome. Methods: 1321 pregnant women were selected from the gynecological clinic of our hospital from January 2013 to June 2018. The gestational age was between 26 and 40 weeks. Of these, 198 were pregnant women with poor pregnancy outcomes and 1123 were pregnant women with normal pregnancy outcomes. Twenty-four pregnant women with neural tube disease were selected as experimental group, and 30 pregnant women with normal fetus were selected as control group. The serum levels of folic acid in pregnant women with fetal neural tube diseases were compared with those of normal pregnant women. Results: There was no significant difference in homocysteine between the experimental group and the control group ( $P > 0.05$ ), but the level of serum folic acid in the control group was significantly higher than that in the experimental group, and the level of folic acid in the normal pregnancy outcome was significantly higher than that in the unfavorable pregnancy outcome ( $P < 0.05$ ). Conclusion: Serum Folic acid levels may increase the risk of neural tube defects and pregnancy outcomes.

### 1. Introduction

Neural tube defects (NTDs), a neural tube defect, are a common congenital malformation commonly found in embryonic development due to incomplete neural tube closure leading to nervous system developmental disorders. Due to geographical and ethnic differences, the incidence of congenital malformations in fetal diseases is between 1‰ and ~1%. Congenital malformation is also a common birth defect disease in newborns. This disease is very common in the fetus and newborn. The disease is a very serious and frequent [1] in fetuses and newborns. Fetal and neonatal neural tube defects are mainly manifestations of no brain malformation, congenital spinal dorsal insufficiency (spinal bifida), brain swelling, cerebrospinal meningocele, cleft lip and cleft palate. The pathogenic factors of NTDs are very complicated, not only genetic factors, environmental factors, but also the amount of Human chorionic gonadotropin in pregnant women in early pregnancy, the demand for the hormone and the levels of vitamin B12 and folic acid in the embryo [2]. In recent years, there have been many studies on the etiology of NTDs at home and abroad, and numerous studies have shown that folic acid disorders in pregnant women are one of the causes [3]. In a survey of 58 countries, Arth et al. [4] found that folic acid-induced NTDs preventive measures were prevented by the addition of folic acid to cereals (about 35,500 cases in 268700 cases). In 2015, the World Health Organization (WHO) recommended that pregnant women have a serum folic acid concentration of 400 ng/mL (906 nmol/L) in the first trimester to prevent NTDs [5]. In this paper, the correlation between serum folic acid concentration in pregnant women with neurological malformation during pregnancy and the pregnancy outcome in NTDs and pregnancy outcomes was studied in the gynecological outpatient clinic of our hospital.

## 2. Objects and Methods

**Participants:** Pregnant women who came to our gynecological clinic from January 2012 to January 2018 agreed to have antenatal examination and voluntarily participated in this study. Among the 1 321 pregnant women aged from 16 to 40 weeks, 198 pregnant women with adverse pregnancy outcomes were screened out. The experimental group consisted of 24 pregnant women with birth defects and the control group consisted of 30 pregnant women with normal fetuses in the same period of Obstetrics and gynecology. The main checkpoints of pregnant women include blood biochemistry, B ultrasound (color Doppler ultrasound), and routine physical examination (blood pressure, uterine height, abdominal circumference, etc.)

**Methods:** Sample collection: All samples have been notified and signed the informed consent form of the pregnant woman, in which case the collection is accepted. All pregnant women's blood samples were collected in the laboratory of our hospital. Methods: collected by laboratory technicians (already unified blood collection training), 5 m L of venous blood from pregnant women's elbows, centrifuged to separate plasma within 30 minutes after collection. And the blood cells, the supernatant is temporarily frozen in a refrigerator at - 20 ° C, and then sent to the laboratory for detection at low temperature. Because the folic acid is unstable, it is necessary to ensure that the specimen is stored and transported before the sample (plasma, serum or lysed blood) is analyzed. In case of light, thermal decomposition and inactivation, no freezing or thawing occurs.

**Detection of serum folic acid in pregnant women:** All specimens were tested (both sent to Jinan Golden Field Testing Center) serum folic acid concentration <10.5nmol/L for folic acid deficiency [6] other test: Ultrasound examination of the fetus of each group of pregnant women, and determine the results. For fetuses with neural tube defects, obstetrics and gynecology clinics recommend that pregnant women stop continuing to conceive.

**Other adverse pregnancy outcomes:** chromosomal abnormalities (trisomy 21 syndrome, trisomy 18 syndrome and trisomy 13 syndrome), spontaneous abortion, premature delivery, expired birth, hydatidiform mole, and color Doppler are judged as Abnormalities were recorded as adverse pregnancy outcomes.

**Analysis:** Statistical analysis was performed using SPSS18.0 statistical analysis. The data were analyzed by t test and X, 2 test. The variance analysis was used to compare each group.  $P < 0.05$  was statistically significant.

## 3. Results

**Comparison of serum. Folic acid levels in the two groups of pregnant women.** There were 4 cases of hydrocephalus in the experimental group, 6 cases without brain, 3 cases with brain swelling, 8 cases with spinal bifida, and 3 cases with compound. There was no significant difference in HCY between the two groups ( $P > 0.05$ ). The serum folic acid level of the experimental group was significantly lower than that of the experimental group ( $P < 0.05$ ).

Table 1 Comparison of folic acid levels between two pregnant women ( $\bar{x} \pm s$ )

project	experimental group (n=24)	control group (n=30)	T value	P value
Folic acid level (nmol/L)	8.4±1.3	15.2±2.6	-5.063	<0.05
Homocysteine (μmol/L)	10.6±1.7	9.5±1.6	-1.374	>0.05

The relationship between folic acid levels of pregnant women's age and gestational age and pregnancy outcomes was statistically significant. The final outcome of pregnant folic acid pregnant women without HCY was higher than that of negative pregnancies.

Table 2 Relationship between serum folic acid level and pregnancy outcome (x + s)

Project	adverse pregnancy outcome group (n=792)	normal pregnancy group (n=4992)	T value	P value
Gestational week	29.2±6.5	28.3±5.7	-0.841	>0.05
Folic acid level				
(nmol/L)	10.4±1.5	15.8±3.4	-4.873	<0.05
Homocysteine				
(μmol/L)	10.2±1.6	9.6±1.6	-0.930	>0.05

#### 4. Discussion

The development of each organ system of the embryo is completed in the 3rd to 8th week, and the nervous system is the earliest organ. The embryo begins to develop around the 3rd week. The differentiation of the central nervous system begins at about 18 days. The 3rd to 4th week is the critical period of the development of the nervous system. During embryonic development, the dorsal canal of the body develops into the central nervous system. The brain evolves from the head end of the canal, and the spinal cord evolves from the tail end of the canal. A series of congenital malformations [2] caused by the stimulation of undesirable factors during this period will hinder or interfere with the normal development of the neural tube and affect its closure. Previous studies have focused on pregnant women with neural tube malformations. This study selected early pregnancy and mid-term pregnant women as the study subjects, and relatively accurately reflected the relationship between folic acid levels. Association of maternal serum folic acid levels with neural tube defects and pregnancy outcome According to reports, [7], folic acid can effectively prevent early pregnancy and neural tube defects during pregnancy. Folic acid plays two main roles in the human body. One is to provide one carbon unit for nucleotide synthesis. Second, folic acid participates in methyl transport in amino acid synthesis. It is closely related to protein synthesis. Folic acid is also one of the necessary cofactors in the metabolism of homocysteine (HCY). According to the epidemiological investigation report in recent years [8], one of the causes of birth defects such as neural tube malformation (NTDS) is folic acid deficiency and HHE (hyperhomocysteinemia). If enough folic acid is not obtained in time during early pregnancy, the synthesis of nucleic acid and protein in the fetus may be inhibited, leading to neural tube defects [9].

According to related reports [10], the lack of folic acid during embryonic development caused the disorder of DNA methylation pattern, which affected the gene expression, gene imprinting and X chromosome inactivation during embryonic development, and led to the important causes of embryonic development abnormalities. Chromosome 21 cannot be separated during meiosis, or may be caused by abnormal metabolism of folic acid. Gomes et al. [11] found that low birth weight infants, premature infants and so on were closely related to maternal serum folic acid levels during pregnancy. The serum folic acid level of pregnant women with fetal neural tube malformation and pregnancy outcome was detected in this paper. The folic acid level of the control group was significantly higher than that of the experimental group. The folic acid level of pregnant women with normal pregnancy outcome was significantly higher than that of pregnant women with adverse pregnancy outcome. Cut correlation should be taken before pregnancy or early pregnancy to take adequate preventive measures of folic acid. Another group of results in this study showed no significant difference in HCY. As HCY is not only involved in Methyl complex but also affected by other metabolic pathways, the level of HCY decreases, it cannot be inferred that the occurrence of NTDs is caused by high levels of HCY. Animal experiments showed that folic acid exhibited irregular developmental symptoms, such as neural tube malformations (distorted nodes, etc.) and growth retardation, when embryos were inadequately ingested. The addition of folic acid can promote the growth and development of embryos, and effectively reduce the occurrence of malformations. This study found that serum folic acid levels in pregnant women with adverse

pregnancy outcomes were significantly lower than those in the normal pregnancy outcomes group, but also in the early embryonic development of folic acid filling role.

## 5. Conclusion

In conclusion, the occurrence of fetal neural tube defects and pregnancy outcomes are closely related to maternal serum folic acid levels. Low serum folic acid levels may be a risk factor for adverse pregnancy outcomes and fetal neural tube defects. Therefore, adequate folic acid should be taken before pregnancy and early pregnancy. It has a preventive effect on neural tube defects (NIDS) and other adverse pregnancy outcomes.

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