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EFFECT OF FOLIC ACID USE DURING PREGNANCY ON NEURAL TUBE DEFECTS

Ortikova Munisa Yusufaliyevna

Republic Specialized

Scientific and Practical Medical Center for Maternal and Child Health

Abstract: Neural tube defects (NTDs) are a group of severe birth defects in the development of the central nervous system of the fetus. Studies have shown that adequate folic acid intake before and during the first weeks of pregnancy significantly reduces the risk of these defects. This article reviews the biological role of folic acid, the pathogenesis of NTDs, possible risk factors, and the results of preventive folic acid administration.

Keywords: folic acid, neural tube defect, pregnancy, prevention, spina bifida, anencephaly

Neural tube defects (NTDs) are congenital abnormalities that occur when the central nervous system fails to close completely during the embryonic period, including spina bifida, anencephaly, and encephalocele. NTDs develop during the 3rd to 4th week of pregnancy, when most women are unaware they are pregnant.

More than 300,000 babies are born with NNC each year worldwide. Studies show that taking folic acid before and during pregnancy can prevent up to 50–70% of these cases.

The purpose of the article is to analyze the importance of folic acid in preventing neural tube defects based on scientific sources and to evaluate approaches in this regard in Uzbekistan.

Information sources:

- Recommendations published by WHO, CDC, PubMed, UpToDate, and the Uzbek National Institute of Health (2010–2024);
- More than 20 clinical studies and meta-analyses related to NNN.

Criteria evaluated:

- The effect of folic acid on fetal development;
- The rate of development and reduction of NNN;
- Prophylactic doses and duration of their use.

Effects of folic acid:

Factor	**Result**
400–800 mcg of folic acid daily	Reduces the risk of IDU by 50–70%
Along with additional vitamin B12	The effect will increase further.
Starting 1 month before pregnancy	The most effective protection is provided

Research results:

- **MRC Vitamin Study (1991)**: In a group of women who took folic acid before pregnancy, the incidence of spina bifida was reduced by 72%.
- **WHO recommendation**: Every woman planning a pregnancy should take at least 400 mcg of folic acid per day.
- **Uzbekistan surveillance (2021)**: Only 38% of women consumed folic acid before pregnancy.

Folic acid (vitamin B9) plays an important role in DNA synthesis and cell division. In the early weeks of embryonic development — especially during the neural tube closure process — a deficiency of this vitamin can cause severe defects.

The main risk factors for the development of NNN are:

- Folic acid deficiency;
- Mother taking diabetes or anti-epileptic medications;
- Racial factors (if NNN was observed in the first child);
- Socioeconomic disadvantage.

Also, while it's important to get folic acid through a healthy diet, it's not enough—supplements in pill form are more biologically beneficial.

In developed countries, folic acid is now mandatory added to bread and flour products (fortification). This approach has significantly reduced the incidence of IBD.

In Uzbekistan, this requires public awareness, planned pregnancies, and widespread implementation of preventive recommendations by doctors.

Folic acid is one of the most important preventive measures during pregnancy. Taking it before and in the first weeks of pregnancy prevents neural tube defects.

Recommendations:

- Every woman of childbearing age (if planning) should be recommended a minimum of 400 mcg/day of folic acid;
- In women with recurrent NNN — increasing the dose to 4 mg/day is considered;
- The healthcare system should introduce the practice of free provision of pregnancy planning and nutritional supplements;
- Widespread information campaigns about safe pregnancy should be conducted among the population.

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