

THE IMPACT OF FOLIC ACID SUPPLEMENTATION ON PREGNANCY

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ABSTRACT

Folic Acid a water soluble vitamin (B9) serves as a fundamental cofactor in folate-intervened one-carbon digestion and in the epigenetic guideline of the translation of qualities that control neural tube closure. FA has increased significance in pregnant women because folate insufficiency has been connected with an assortment of clutters including birth imperfections and deformities in the improvement of neural tube closure. The folate supplementation also has beneficial role on pregnancy outcomes along with neural tube defects (NTD) reduction in women with seizures, preeclampsia, foetal development limitation and future chemical imbalance hazard. Whereas, over dosage of folic acid supplementation during pregnancy may be responsible for increased risk of cancers, severe adverse effects like heart problems, ectopic pregnancy and may also lead to miscarriage.

Keywords: Folic Acid, Neural tube defects, Pregnancy, Foetal development.

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INTRODUCTION

Folic Acid (FA) is a water-dissolvable nutrient (B9), adds to neural tube closure by improving cell expansion. Folate works as cofactors in cell division and cell support as well as in regulating the gene expression through epigenetic mechanisms [1] since 1990s, proof rose about the defensive impact of FA supplementation against the occurrence of neural tube defects (NTDs). [2, 3]. It serves as a fundamental cofactor in folate-intervened one-carbon metabolism that regulates the transcription of genes which control the neural tube closure [4] FA has increase significance in pregnant women due to its promising job in adjusting assorted clinical conditions, though folate insufficiency has been connected with an assortment of clutters including birth imperfections and deformities in the improvement of neural tube closure [5, 6, 7].

Preterm delivery contributes to the incidence of low birth weight infants. In the United States, two-thirds of infants weighing <2500 g are delivered preterm (<37 completed wk) [8] Folate supplementation may also have beneficial role on pregnancy along with NTD decrease in women with preeclampsia, fetal development limitations and future autism risk. Many studies have also shown that supplemental folate during pregnancy may cause severe adverse effects like heart problems, leukemia, and ectopic pregnancy. An inability to absorb synthetic folate may cause miscarriage. Some studies have also shown that taking

supplemental folic acid past early pregnancy has no benefits, and to the contrary, may even put babies at an increased risk of developing asthma. Hence we performed this review on various studies to understand the overall adverse effects caused due to consumption of over dosage of folic acid during pregnancy. [9]

Folate synthesis

FA is key to folate-requiring one-carbon metabolism which has role in various cell responses. These include amino acid metabolism, biosynthesis of purine and pyrimidine; (the structure hinders for DNA and RNA blend), and development of essential methylating operator S-adenosyl-methionine (SAM), which is the widespread methyl contributor for DNA, histones, proteins and lipids. [10] Folate is invested in the digestive system and additionally liver and processed fundamentally to 5-methyl tetrahydrofolate (5-methylTHF) and in this manner gets polyglutamate for cell maintenance. FA devoured in braced nourishments/supplements is decreased primarily to dihydrofolate by the chemical dihydrofolate reductase in the liver lastly changes over to the tetrahydrofolate (THF), the substrate for polyglutamate synthetase. The polyglutamyl type of tetrahydrofolate (THF) framed either from FA or ordinary dietary folate is the focal folate acceptor atom in the one-carbon cycle. Next, THF is changed over to 5,10-methyleneTHF by nutrient B6 subordinate serine hydroxymethyltransferase and afterward decreased irreversibly to 5-methylTHF by

methylenetetrahydrofolate reductase (MTHFR). 5-Methyl-THF goes about as an essential methyl benefactor for the remethylation of homocysteine to methionine. Methionine is a key substrate for S-adenosylmethionine (SAM) which assumes a focal job in methylation responses catalyzed by DNA methyl transferases (DNMTs) shaping 5-methylcytosine. [11, 12, 13]

Seizure outcomes

FA supplementation during pregnancy may have prompt modifications in mental health bringing about changes in behaviour and at long last, 4mg FA/day prior and during growth of foetus, appears to diminish 42% of offspring's seizure threshold. [14]

Respiratory and unfavorably susceptible results

In 2009, two articles that raised worries about conceivable unfriendly respiratory wellbeing results in little youngsters related with maternal utilization of folic acid enhancements during pregnancy. In Norway, Håberg et al found that folic acid enhancements in the first trimester of pregnancy somewhat expanded the danger of wheeze and lower respiratory tract infections upto ≤ 18 months infants related to epigenetic mechanisms. [15]. In Australia, Whitrow et al demonstrated that supplementation of folic acid enhancements in late pregnancy (30–34 weeks) was identified with an expanded danger of asthma at 3.5 yrs and of persistent asthma at 3.5 and 5.5 yrs. [16] One investigation proposes that posterity of moms that were administered with FA

during the first trimester of pregnancy, had higher chances of being diagnosed with bronchiolitis compared with no FA supplementation in pregnancy. [17, 18]

Oral clefts outcomes

Badovinac et al audited five imminent investigations and 12 case–controls studies and presumed that taking a folic acid containing supplements during pregnancy had a defensive impact against the danger of creating oral clefts [19]. In contrast a research stated a detailed expanded danger of orofacial clefts when there was a reliable enhancement of Folic acid usage during the aetiologically significant period (weeks 0–12 post origination) [20]

Preeclampsia outcomes

Preeclampsia is one of the most significant and regular complications during pregnancy and one of the primary cause of maternal and fetal mortality [21]

Researchers have found that women who take high amount of folic acid from Pre-pregnancy to Mid-pregnancy may expand their risk for hazardous high blood pressure. Folic Acid with iron and Vitamin B12 assumes to have significant role in blood creation and folate deficiency can be the reason for some lethal issues such as defects in neural tube defects like anencephaly and spina bifida. [22] In the meantime, other research found that the dose of 0.4mg/day FA alone in the early pregnancy can't prevent GHT and preeclampsia. [23]

Heart defects outcomes

Congenital heart diseases (CHDs) are among the significant birth defects in babies and influence around 4 to 10 for every 1,000 live births [24]. The most grounded proof that multivitamins containing folic acid taken periconceptionally will essentially decrease the danger of inborn heart defects is upheld by information from a Hungarian RCT Fetal development. [25]

Foetal growth and other outcomes

A high FA portion (4mg/day) in the preconception doesn't appear to restrict fetal development, when compared with a suggested portion of 0.4mg/day. [26] However, FA supplementation in suggested portions (0.4–0.5mg/day) can be related with expanded fetal development, and higher placental weight, bringing about higher birth weight and diminished danger of low birth weight or small for gestational age (SGA). [27]

Metabolic syndrome outcomes

A study in Nepal uncovered that FA supplementation during pregnancy seemed to have the best valuable impact on offspring's kidney capacity and lower danger of metabolic disorder among the posterity. Furthermore high folate intake is additionally found to bring about huge down regulation of folate transporters in kidney, and consequently dysregulate the renal folate take-up process. [28, 29, 30].

Conclusion:

Folic acid which has its crucial role on pregnancy outcomes will be beneficial if taken before pregnancy and during the first trimester in prescribed doses. In later

period it may be advised to make sure to avoid getting too much of folic acid. Enough folate can be obtained through food sources like cereals, legumes, dark leafy greens that usually do not carry the same risks as synthetic folate as they are metabolized differently in the body.

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