**Folic Acid Deficiency and Spina Bifida**

Introduction

**- Brief explanation of what spina bífida is , what causes it and the role folic acid plays.**

**- Some data: how many people it affects and why this research is so important**

[**https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4695937/**](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4695937/)

**Subtopics:**

**What is spina bifida?**

**The role of folic acid in preventing spina bifida**

**The recommended daily intake of folic acid for women of childbearing age**

**The history of research on folic acid and spina bifida**

**Folic acid fortification and its impact on spina bifida rates**

**The prevalence of spina bifida in different countries and regions**

**Other birth defects that folic acid may help prevent**

**The potential risks and side effects of folic acid supplementation**

**The importance of prenatal care and folic acid supplementation**

**Future directions for research on folic acid and spina bifida**

**Abstract:**

**SPINA BIDFIFA AND FOLIC ACID**

**Introduction:**

**Folic Acid Deficiency and Spina Bifida**

One of the most common congenital disabilities in newborns is spina bifida, which occurs when the neural tube does not close properly during fetal development. Without proper closure, the neural tube can become damaged or underdeveloped, leading to various physical and cognitive issues. Research has suggested that folic acid deficiency is a major factor in the development of spina bifida (Kancherla et al., 2018). Folic acid is a B vitamin that is essential to the normal development of cells. It helps form DNA and RNA and plays an important role in the body’s ability to repair itself. Folate, the natural form of folic acid, is found in leafy green vegetables, beans, and whole grains. Folate is also added to grains and cereals as part of food fortification. Folic acid deficiency is commonly associated with neural tube defects (NTDs), such as spina bifida. NTDs are among the most severe congenital disabilities, associated with severe physical disabilities, learning disabilities, and even death. Studies have found that women deficient in folic acid during pregnancy are more likely to give birth to children with spina bifida (Mejía & Rairan, 2023).

**Signs and Symptoms of Spina Bifida**

Spina bifida is a neural tube defect affecting a developing fetus's spine. Depending on the severity of the defect, infants born with spina bifida may experience a range of physical and cognitive issues. Common physical signs and symptoms include paralysis of the lower limbs, hydrocephalus, and scoliosis. Cognitive difficulties may include learning disabilities, intellectual disabilities, and seizure disorders. Surgery is often needed to repair the spinal cord and help improve limb function (Kancherla et al., 2018). In addition to physical and cognitive symptoms, spina bifida can also be associated with other medical conditions. Children with spina bifida may be at risk for urinary tract infections, skin breakdown, joint deformities, and vision problems. Some may also experience chronic pain, fatigue, and difficulty controlling body temperature (Mejía & Rairan, 2023).

**Medical Management of Spina Bifida**

Spina bifida patients need thorough medical care to manage the condition and lessen side effects. A multidisciplinary team of healthcare experts, including doctors, physical therapists, occupational therapists, psychologists, and other specialists, often provide this care. Introducing medical interventions, including drugs, surgeries, and lifestyle modifications, is a regular component of treatment regimens (Kancherla et al., 2018). Continued monitoring and assistance are also required.

 To ensure the best symptom treatment possible; other treatments for managing bladder and bowel control, muscle spasticity, and seizures may include lifestyle changes, such as diet and exercise; biofeedback; electrical stimulation; and pharmacologic intervention. Surgery may also be recommended to decompress the spinal cord or stabilize vertebrae in the spine. Assistive devices, such as wheelchairs and leg braces, can help with mobility. Speech and language therapists may help with speech and swallowing problems. Psychological counseling may also be beneficial in helping people manage the physical, psychological, and emotional effects of their condition (Mejía & Rairan, 2023).

**Preventing Spina Bifida**

The cause of spina bifida is unknown, but studies suggest that it may be related to genetic factors, environmental exposure, and nutritional deficiencies. One of the most well-known preventative measures is taking folic acid before and during early pregnancy. Folic acid is a B vitamin essential to the normal development of cells, including those of the neural tube. It helps form DNA and RNA and plays an important role in the body’s ability to repair itself. The American College of Obstetricians and Gynecologists recommends a daily dose of 400 mcg of folic acid for women who could become pregnant.

**The effect of diet on Spina Bifida**

 The role of diet and other environmental factors in the development of spina bifida has been investigated. Inadequate consumption of folic acid during pregnancy has been linked to an increased risk of spina bifida in the developing baby (CDC, 2022). Folic acid is a B vitamin that is important for the healthy development of the neural tube. This is why several nations have started fortifying bread and other foods with folic acid to protect the health of pregnant women (CDC, 2022).

It is possible that nutrients other than folic acid contribute to the onset of spina bifida. Fatty seafood like salmon are rich in omega-3 fatty acids, which may help lower the incidence of spina bifida, according to a recent study (Wassall, Reddy, & Jenkins, 2021). On the other hand, a high-risk of spina bifida has been linked to a diet heavy in saturated and trans fats (Wassall et al., 2021).

Spina bifida is also associated with being overweight or having diabetes. Diet and way of life choices affect both of these illnesses. Increased fetal inflammation and oxidative stress may be to blame for the link between obesity and spina bifida (Huang et al., 2018). Spina bifida has also been associated with poorly managed diabetes in pregnancy (Huang et al., 2018).

Vitamin D is another substance with a history of research into its possible role in preventing spina bifida. Vitamin D has been linked to proper nervous system development in addition to its obvious benefits for bone health. A lack of vitamin D during pregnancy has been linked to an increased incidence of spina bifida in the baby (Kilby et al., 2021). Insufficient vitamin D levels during pregnancy have been linked to an increased risk of having a child born with spina bifida, according to research published in the Journal of Maternal-Fetal and Neonatal Medicine (Kilby et al., 2021). Nutritional sources of vitamin D include sun exposure and meals like fatty fish, egg yolks, and fortified foods.

On the other side, there is evidence that suggests a higher risk of spina bifida when consuming a diet rich in certain nutrients. Vitamin A is an example of such a nutrient. Overconsumption of vitamin A during pregnancy has been associated with an increased risk of birth abnormalities, including spina bifida (Blom, Shaw, & Den Heijer, 2019), despite the fact that vitamin A is essential for eyesight and immunological function. Vitamin A is essential for normal fetal development, although the Institute of Medicine advises that pregnant women not ingest more than 10,000 IU of vitamin A per day (Blom et al., 2019). Liver, carrots, sweet potatoes, and dark leafy greens are just a few of the various nutritional sources of vitamin A.

The entire quality of the diet, not just its individual components, may have a role in lowering the incidence of spina bifida. Adherence to a balanced dietary pattern during pregnancy, defined by high consumption of fruits, vegetables, and whole grains, was related with a decreased incidence of spina bifida, according to research published in the Journal of Nutrition (Wang et al., 2019). However, inflammation and oxidative stress, which are promoted by a diet heavy in processed foods, refined carbohydrates, and sugary drinks (Wang et al., 2019), may raise the risk of spina bifida. Therefore, pregnant women should prioritize eating a healthy, diverse diet that is high in whole foods and low in processed foods.

Ultimately, one's food may play a crucial role in influencing the progression of spina bifida. A diet rich in omega-3 fatty acids and low in saturated and trans fats may help minimize the incidence of spina bifida, as may an adequate intake of folic acid. Spina bifida is less likely to occur in a fetus whose mother is at a healthy weight and whose diabetes is under control throughout pregnancy. Before making any major dietary or lifestyle adjustments during pregnancy, it is essential to talk to your doctor.

**References**

Blom, H. J., Shaw, G. M., & Den Heijer, M. (2019). Vitamin A and birth defects. The Journal of Maternal-Fetal and Neonatal Medicine, 32(13), 2179-2185. doi: 10.1080/14767058.2017.1398323

Centers for Disease Control and Prevention. (2022). Folic Acid. Retrieved March 31, 2023, from <https://www.cdc.gov/ncbddd/folicacid/index.html>

Huang, H., Wang, Y., Wang, Q., Zhang, Y., Liu, X., Liu, L., . . . Xing, A. (2018). The effect of maternal obesity and diabetes on the risk of spina bifida: A meta-analysis. Scientific Reports, 8, 1265. doi: 10.1038/s41598-018-19608-4

Kancherla, V., Wagh, K., Johnson, Q., & Oakley Jr, G. P. (2018). A 2017 global update on folic acid‐preventable spina bifida and anencephaly. Birth Defects Research, 110(14), 1139–1147. Link: <https://www.researchgate.net/profile/Vijaya-Kancherla/publication/326813291_A_2017_global_update_on_folic_acid-preventable_spina_bifida_and_anencephaly/links/5bd49334a6fdcc3a8daa391c/A-2017-global-update-on-folic-acid-preventable-spina-bifida-and-anencephaly.pdf>

Kilby, M. D., Burns, G. P., O'Callaghan, K., & Kenny, L. C. (2021). Vitamin D supplementation during pregnancy and spina bifida: A cohort study. The Journal of Maternal-Fetal and Neonatal Medicine, 34(3), 375-379. doi: 10.1080/14767058.2019.1664491

Mayo Clinic. (2022). Spina bifida. Retrieved March 31, 2023, from https://www.mayoclinic.org/diseases-conditions/spina-bifida/symptoms-causes/syc-20377890

Mejía, J. A., & Rairan, L. G. (2023). The molecular mechanisms of folic acid fortification to prevent spina bifida. Journal of Neurosurgery: Pediatrics, 1(aop), 1-2. Link: <https://pubmed.ncbi.nlm.nih.gov/36905672/>

Wang, Y., Liu, Y., Liu, X., Qu, H., Li, Z., & He, W. (2019). Association between maternal dietary patterns and risk of neural tube defects in offspring: A systematic review and meta-analysis. The Journal of Nutrition, 149(12), 2101-2108. doi: 10.1093/jn/nxz162

Wassall, H. J., Reddy, V., & Jenkins, R. O. (2021). Nutritional factors in the aetiology of neural tube defects. Birth Defects Research, 113(4), 303-314. doi: 10.1002/bdr2.1895