

Role of Healthy food in Prevention of Neural Tube Defects: A Review

Himesh Soni^{1*}, Sarvesh Sharma¹, Jitender K Malik² and Satish K. Sarankar³

¹D.H.S. Bhopal Madhya Pradesh, India

²Bharat Institute of Pharmacy, Sonapat Haryana, India

³IES Institute of Pharmacy, Ratibad, Bhopal, India

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*Corresponding author: Himesh Soni

Email: himeshsoni@rediffmail.com

Abstract

Neural tube defects (NTDs) are general complex congenital malformations consequential from failure of the neural tube closure during embryogenesis. It is recognized that folic acid supplementation decreases the predominance of NTDs, which has led to national public health policies regarding folic acid. To build your healthful pregnancy the choice diet includes a variety of nutrient-packed foods from the following groups: Fruits, Vegetables, Dairy foods, Protein, Whole grains etc. The present review focus on the some of the folic acid rich supplement food which helps to healthful pregnancy and lower the risk of congenital birth defect (NTDs).

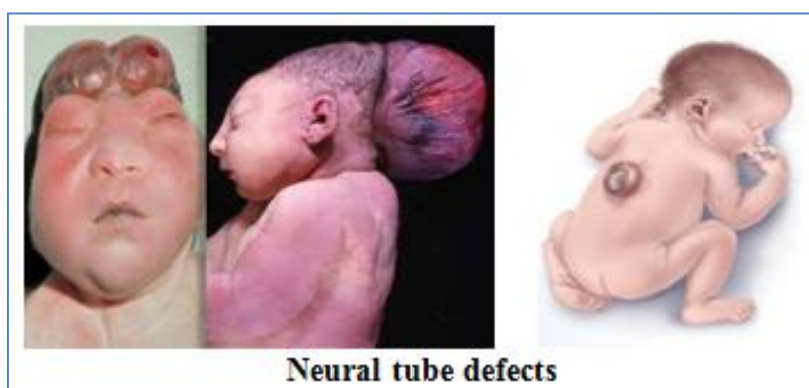
Keywords: Neural tube defects (NTDs), folic acid (folate), Legumes & Fruits.

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INTRODUCTION



Herbal drugs play an important role in health care programs chiefly in developing countries. Ancient Indian literature incorporates a extremely broad definition of medicinal plants to be potential sources of medicinal substances. Diet is believed to play an important role in prevention of diseases. Foods that contain components active in disease prevention and that serve specific bodily functions, in addition to being

nutritious, are defined as functional foods [1]. Neural tube defects (NTDs) are general complex congenital birth defect resulting from failure of the neural tube closure during embryogenesis. It is recognized that folic acid supplementation decreases the prevalence of NTDs. NTDs caused by problems in closing of the neural tube during development. It may influence any part of the brain or spinal cord [2].

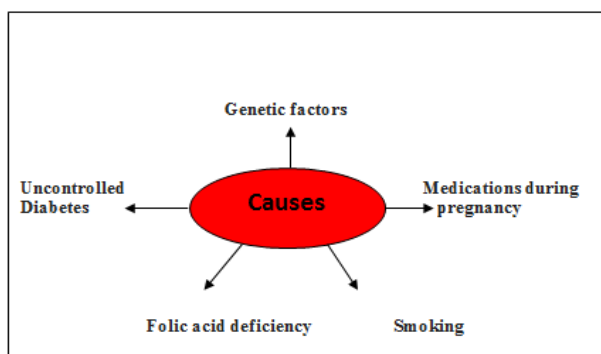
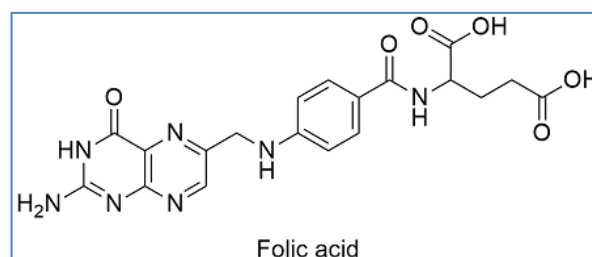


Types of NTDs: Spina bifida (most) common and Anencephaly *i.e* “open” NTDs in which the neural

tissue is exposed and “closed” NTDs with the neural tissue covered by tissue [3, 4].

Spina Bifida	Anencephaly
<p>It also called “open spine” Affects vertebrae and spinal cord Main types :</p> <ul style="list-style-type: none"> • Spina bifida occulta • Spina bifida cystica / aperta • Meningocele • Myelomeningocele 	<ul style="list-style-type: none"> • It mainly affected brain and skull development • Top part of head and brain does not form • Patients are blind, deaf, unconscious • Patients do not usually survive longer than days 

Neural tube defects are birth defects that are characterized by abnormalities in the spine, brain or spinal cord of the developing foetus. It is one of the most common forms of birth defects in babies worldwide. These defects occur during the first month of the pregnancy and are detected in the first trimester itself. Various cause of NTDs [5].



Folate(vitamin B9) is a water-soluble B vitamin that occurs naturally in food. Folate gets its name from the Latin word “folium” for leaf. Folic acid (pteroylmonoglutamic acid), which is the most oxidized and stable form of folate, is the form of vitamin supplements. Structurally folic acid is fusing of a *p*-aminobenzoic acid molecule linked at one end to a peridine ring and at the other end to one glutamic acid molecule[6].

Folate is significant for nucleotide synthesis, and preconceptional intake of dietary folic acid (FA) is attributed with reduced incidences of neural tube defects in infants [7]. Previous investigation has been suggested that specific folates deficiency at the cellular level may be responsible for NTDs due to disturbed folates bioavailability [8]. Folate also related to NTD risk through their roles in nucleotide synthesis [9]. The body needs folate to form blood. During first trimester of pregnancy (first 4 weeks of pregnancy) folate is essential for the growth of the baby's brain, spine and skull. Daily need of 0.4 milligrams (400 micrograms) of folic acid every day for at least 3 months is necessary during pregnancy. The present review spotlight on the some of the folic acid rich supplement food which helps to healthful pregnancy and lower the risk of congenital birth defect (NTDs).

Folate Rich Foods: Necessary during Pregnancy Asparagus

Asparagus racemosus (Shatavari) *Asparagus racemosus* is the most usually used in traditional medicine. In the ancient literature of Ayurveda the use of *Asparagus racemosus* was mentioned. It is generally used to rectify the gynecological problems like irregularities in menstrual cycle and sexual dysfunction [10]. *Asparagus* contains about 128-141 µg of folic acid [11].

*Asparagus racemosus***Chukander (Beet root)**

Scientifically Beet root known as *Beta vulgaris* belonging to this family Chenopodiaceae. It contains about 80 µg (fresh beetroots per 100 g) of folic acid [12].

**Beet root****Broccoli**

Broccoli biologically known as *Brassica oleracea* (Brassicaceae) is recommended in case of vitamin A deficiency (xerophthalmia), infantile scurvy (vitamin C deficiency) and anemia resulting from folate deficiency [13]. It contains about 63 µg of folic acid [14].

**Broccoli****Cauliflower**

Brassica species are incredibly rich in health-promoting phytochemicals, including phenolic compounds, vitamin C, and minerals. *Brassica oleracea* commonly known as “Phoolgobhi”. Cabbage has prevalent use in traditional medicine due to its antioxidant, anti-inflammatory and antibacterial properties, in improvement of symptoms associated with gastrointestinal disorders (gastritis, peptic and duodenal ulcers, irritable bowel syndrome) [15]. Folate content is about 57 µg/100g [16].

**Cauliflower****Peas**

Pisum sativum particularly green and yellow cotyledon dry peas, also called as smooth peas or field peas. It contains various phytochemicals with numerous medicinal values include polyphenolics, in coloured seed coat types in particular, which may have antioxidant and anticarcinogenic activity, saponins which may exhibit hypocholesterolaemic and anticarcinogenic activity, and galactose oligosaccharides which may exert beneficial prebiotic effects in the large intestine [17]. Folate content is about 65 µg/100g [16].

**Peas****Soybean**

The soybean (*Glycine max*) is a species of legume. The beans contain considerable amounts of α-linolenic acid, omega-6 fatty acid and the isoflavones like genistein and daidzein. Dry soybean contain 36% protein, 19% oil, 35% carbohydrate (17% of which dietary fiber), 5% minerals and several other components including vitamins. A number of investigations demonstrated the various pharmacological potential like hypocholesterolaemic effect, anticarcinogenic effects of soy beans, and the ability of soy beans to lower the risk of osteoporosis, cardiovascular disease as well as relieving menopausal symptoms, renal disease beneficial effect against diabetes and antioxidant activity [19]. Folate content is about 165 µg/100g [20].



Soybean

Parsley

Petroselinum crispum has been used as carminative, gastro tonic, antiseptic of urinary tract, diuretic, anti-dote, anti-urolithiasis and anti-inflammatory and for the treatment of amenorrhea, dysmenorrhea, gastrointestinal disorder [21]. Folate content is about 152 µg/100g [22].



Parsley

Spinach

Pinacia oleraceais commonly known as Spinach (English), Chhurika (Sanskrit), Palak (Hindi). Spinach has a high nutritional value and is tremendously rich in antioxidants, especially when fresh, steamed, or quickly boiled. It is a prosperous source of vitamin A (lutein), vitamin C, vitamin E, vitamin K, magnesium, manganese, folate, iron [23]. Folate content is about 194 µg/100g [24].



Spinach

Cowpeas

Vigna unguiculata (cowpea) is a widely cultivated legume in central Asia. Cowpea seeds contain bioactive compounds which is beneficial to

human health. Phenolic compounds, the most important group of phytochemicals in cowpea having the potential to protect the body against chronic diseases²⁵. Folate content is about 168 µg/100g [26].



Cowpeas

Collards

Brassica juncea (Cruciferae) leaves are used in a variety of folk medicines as stimulants, diuretics and expectorants as well as a spice. The chief pungent chemical constituent of such commercialized oils is Allyl isothiocyanate. This isothiocyanate is considered to be the most significant cancer chemo-preventive phytochemical with additional potential health benefits [27]. Folate content is about 129 µg/100g [28].



Collards

Avocado

Persea americana (Lauraceae) also known as the alligator pear. Major component is vitamin E has been reported to elicit an antioxidant against the reproductive disorders [29]. Hass Avocado contains about 60mg of Folate [30].



Avocado

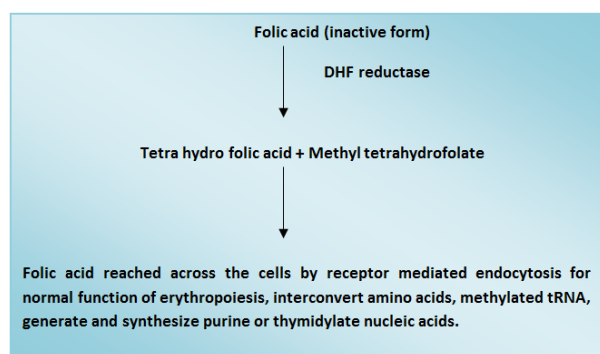
Sweet oranges

Citrus is the biggest genus in the family Rutaceae. *C. sinensis* (Sweet orange). *C. sinensis* contains about 15-20 µg of Folate [31].



Sweet oranges

Pharmacology of Folic acid [32]



SUMMARY

Neural tube defects (NTDs) are amongst widespread birth defects contributing to infant mortality and serious disability. Folic acid plays key role biosynthesis of nucleotides. Deficiency of folate leads failure to biosynthesize the proper nucleotides during early pregnancy, which disrupt the neural plate depletion and causes NTDs. Folic acid-containing supplement consumption during one trimester of pregnancy can be preventing NTDs proved clinically. The increased consumption of food folate would prevent NTDs as efficiently as a daily vitamin supplement containing 400 µg of folic acid which require additional intake of folate rich foods. Vitamin B9 is a water-soluble vitamin that has no recognized toxicity. Higher doses of folic acid can correct the pernicious. Diet is believed to play an important role in disease prevention. They may include vegetables or fruits. The present assessment spotlight on the some of the folic acid rich supplement food which helps to healthful pregnancy and lower the risk of congenital birth defect (NTDs).

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