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EXTRACTION OF FOLIC ACID FROM SUNFLOWER SEED AND ITS SUPPLEMENTATION FOR FETAL GROWTH: A NARRATIVE REVIEW

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ABSTRACT: Vitamin B4 (folate) is a naturally occurring vitamin. Folic acid helps healthy RBCs. It helps make DNA and other genetic material. These seeds are high in folic acid. Folic acid is crucial in labour. Consumption of edible seeds, notably sunflower seeds, reduces the risk of coronary heart disease, high cholesterol, and hypertension. This review focuses on extraction of folic acid from sunflower seed and its impact on fetal growth. From sun flower seed, folic acid is extracted primarily via High Power Liquid Chromatography. Folate are degraded while cooking (thermal degradation), the sutiable technology for extraction of folic acid is microbial growth method and High power Liquid chromatography. L- methylfolate (l-5 Methyltetrahydrofolate) is an important micronutrient form of folate that are dissolved in plasma and participate in biological activities. Methylene – tetra hydrofolatereductase (MTHFR) enzyme serves a key function for almost all biological processes that involve the metabolism of methionine and folic acid. l-methylfolate supplementation is preferred , rather than folic acid to decrease folate related pathological diseases.

KEYWORDS: Folic acid, Dietary supplements, Sunflower seeds, Pregnancy, Chromatography, Methionine, Methyl folate, NTDs, Homocysteine .

1. INTRODUCTION

Folic acid is the synthetic version of folate, which is a naturally existing vitamin B. Folic acid aims to strengthen healthy RBCs. It also helps to produce DNA as well as other genetic material. If we may not have enough folic acid, the body can create unusually large red blood cells that do not perform correctly. The main shortage of folic acid induces anaemia. Folic acid (Vitamin B12 or Vitamin B9) are nutrients that cannot be synthesized in the body and must be provided by diet. Sufficient level of folic acid can help prevent serious birth malformations of crucial fetal brain and spine, including NTDs[1].

A suggested prenatal vitamin should contain at least 100 percent of necessary for 3 important nutrients: folic acid, Vitamin B12 and iron. During Pregnancy the requirement of each nutrients, both organic and in organic, will expand, and will be tough to sync up with wants of the fetus. It is impossible to achieve these needs with nutrition alone. Of these folic acid is thought to be most significant. Basic nutrient supply of folic acid comprises of; Dark green leafy vegetables (spinach, lettuce, asparagus sprouts, broccoli), Legumes, Beans, Sunflower seeds, Fruits and veggies, fruit drinks, Whole grains, Liver and Sea foods[2].

Sunflower seeds contain lots of folic acid. In labor it is vital to check folic acid . It is established that palatable seed consumption including sunflower seed minimizes the incidence of coronary heart disease, elevated cholesterol and high blood pressure. Sunflower seeds are a source of numerous vitamins and minerals that can help our immune system and increase your ability to fight off illnesses[3]. Sunflower kernels (inner seed) can be roasted with or without the shell on, and are most typically eaten after removing the shell. Shells have lot of fiber and can be consumed. Sunflower seeds are high in protein and rich in healthy fats, as well as anti oxidants that can lower chance of developing serious disorders. It is also a good source of Vitamin E, B1, B6, Iron, Copper, Selenium, Manganese, Zinc[4].

Table 1: Nutritive value of sunflower seeds

Nutritive value	**RDI**
Folate	17% of RDI
Pantothenic acid	20% of RDI
Iron	6% of RDI

Magnesium	9% of RDI

Of many of the plant - based foods, sunflower seeds are the greatest in folate which are connected with the protection of cardiovascular illnesses. They have higher level of folic acid per gram than spinach or Brussels sprouts. Sunflower seeds are also a significant source of niacin, folate and B6. Sunflower is a treasure trove of pantothenic acid too though[5].

2. METHODOLOGY

Chromatography is a process for dissolving a sample. It is commonly used to recover protein, peptides, and other biomolecules. The sample interacts with the mobile and stationary phases, resulting in different physicochemical reactions. Chromatography can be used to analyse a mixture by sending its output into a detector. It can also be used to purify a combination for use in other investigations or operations.

Liquid chromatography is a technique for separating samples. It is commonly used to recover protein, peptides, and other biomolecules. Molecular separation in a liquid mobile phase with a solid stationary phase. The sample interacts with the mobile and stationary phases, resulting in different physicochemical reactions. Solvent extraction involves mixing a metal solution with a solvent to extract the micronutrient. Compounds are segregated depending on their relative solubilities. Solvent extraction is also used to remove pollutants from sludge and silt. Solvent extraction is the treatment of a substance with a solvent to separate it into soluble components.

High performance liquid chromatography (HPLC): This approach can identify, separate, and quantify sample components. Liquid chromatography uses a liquid mobile phase with excellent resolution (ability to distinguish between two components). HPLC purifies components based on polarity (tendency of molecule to like or dislike water). Polar (hydrophilic) or non-polar compounds (hydrophobic).

Samples include blood, bacteria, fungi, and plant components. The mobile phase is a liquid solution (90% water, 10% organic solvent) that is hydrophilic. With the help of a pump, mobile phase enters the column, mixing with sample. Components of the sample are separated inside the column. The hydrophilic molecules in the sample mix with the mobile phase and exit the column first. Hydrophobic samples will mix with stationary phase. The hydrophilic molecules that exited the column are detected. This detector delivers a signal to the graphing system. Initially, a buffer is passed through the column to equilibrate it. The detector creates a graph base line. After the sample and mobile phase mix, the graph shows a peak of hydrophilic molecules. The detector also has a collecting tube for hydrophilic substances. Hydrophobic molecules in the sample bond with resin in the column and slowly move through it.

Then, a concentration gradient is applied. The amount of water in the mobile phase drops, and the polarity of the mobile phase shifts to hydrophobic. The mobile phase and sample enter the column and are collected in another column. The detector also peaks. Thus, the first peak is for hydrophilic molecules while the second is for hydrophobic. The result is a Chromatogram. This graph shows the retention time (time the organic material stays inside the column) and concentration (Y-axis) (absorbance). The area of the peak can be used to calculate the concentration of organic material in the column. High pressure liquid chromatography is a method of purifying components by passing them through a column under high pressure.

3. RESULTS

From sun flower seed, folic acid is extracted largely by High Power Liquid Chromatography. Folate content in food is concentrated through trimetric technique. Vitamin B are reduced or oxadised for detection of folate in RBC and Lymphocytes. Folate are damaged while cooking (thermal degradation), the sutiable technology for extraction of folic acid is microbial growth method and High power Liquid chromatography. L- methylfolate (l-5 Methyltetrahydrofolate) is an essential micronutrient form of folate that are dissolved in plasma and participate in biological activities. l- methylfolate for methyl donation in synthesis of purine and pyramidine during DNA and RNA creation, control homocysteine metabolism. Methylene – tetra hydrofolatereductase (MTHFR) enzyme plays a vital function for practically all biological processes that involve the metabolism of methionine and folic acid. l-methylfolate supplementation is preferred , rather than folic acid to minimize folate related pathological disorders.

In addition to being required for DNA replication, folate (vitamin B9) is an enzyme substrate involved in amino acid synthesis and vitamin metabolism. During pregnancy, folate is necessary for the foetus' growth and development. Folate deficiency has been linked to malformations in both mothers and foetuses (congenital abnormalities). On the other hand, l-methylfolate may be used to prevent pregnancy-related issues other than neural tube abnormalities.

4. DISCUSSION

Folic acid (vitamin B9) is the form of folate that is physiologically active. In its most basic form, folic acid (folate), which is the conventional name for biologically active folates, is composed of 4-aminobenzoic acid and L-glutamic acid. L-methyl folate and tetrahydrofolic acid are the forms of folic acid that are biologically active (TH4). Fa in human blood serum typically ranges between 2 to 15ng mL, which is considered normal. It should be noted that neither folate nor folic acid are metabolically active substances. The goal is to minimise them in order to engage in cellular metabolism. Methyltetrahydrofolate (L-methylfolate) is an essential micronutrient form of folate that is dissolved in plasma and participates in a variety of biochemical reactions[6].

Methyl folate, the active form of folic acid, is essential in the conversion of homocysteine into methionine, which is a non-toxic amino acid that is found in many foods. In pregnant women, homocysteine is an intermediate metabolite that has been linked to an increased risk of placenta-mediated problems, such as preeclampsia, placental abruption, foetal development limitation, and even pregnancy loss. Normally, vitamins B12, B6, and folic acid break down homocystine and transform it into other substances that are required by the body for proper function[7]. Homocystine levels in the blood should be reduced to a lesser extent. It is possible that high levels of homocysteine in the blood indicate a vitamin shortage, cardiac disease, or a rare genetic illness when measured. One of the bioactive compounds required by the body is Methionine, which is created through the conversion of homocysteine and boosted by l-methyl folate, an active form of folic acid. Methionine is one of the essential amino acids for the body. The placenta is a foetal organ that serves as a conduit for communication between the mother and the foetus[8]. During its development, this organ must perform its functions, such as transport and secrecy, to ensure its survival.

5. CONCLUSION

1. To develop RNA & DNA synthesis
2. Improve the circulatory movements
3. To improve cell growth, development and differentiation.
4. To prevent Anaemia during pregnancy.
5. Helps the development of nervous system of a developing fetus.

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