IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 20, Issue 2 Ser.10 (February. 2021), PP 14-17
www.iosrjournals.org

The prevalence of folate deficiency in pregnant women in Al Jalaa Tripoli Hospital outpatient department

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Abstract
Background*: During pregnancy, there is an increase in cases of folic acid deficiency which causes megaloblastic anemia, neural tube defects, and cardiovascular disease in neonates. Therefore the aim of the study was to find out the percentage of incidence of folic acid deficiency in pregnant women in Libya.*
Materials and Methods: *For the study, a total of 40 pregnant women volunteers were enrolled and investigated in Al-Jalaa hospital, out-patient department (OPD), Tripoli, Libya. They were investigated carefully at Al-Jalaa hospital OPD between the periods of 25 January, 2010 to 5 February, 2010.*
Results*: indicated that the incidence of folic acid deficiency in pregnant women was 12.5% and was not high as the women were being treated with folic acid orally and had a normal folic acid level.*
Key Word*: pregnant woman; folate; folic acid; teratogenicity.*

Date of Submission: 11-02-2021 Date of Acceptance: 26-02-2021

I. Introduction

Folic acid is a water-soluble vitamin, involved in the synthesis of nucleic acid, blood cells and nervous tissue. It is also a substrate for variety of reactions that affect metabolism of many amino acids, including transulfuration and transmethylation pathways that lead to interference with DNA synthesis to abnormal cell detachment[1]. The main dietary sources of folic acid include cooked dried beans, green leafy vegetables, and fortified grains[2]. Other food like orange juice and white bread having low content of folic acid are also important contributors of folic acid in diet because they are taken frequently. An additional source of folic acid includes multivitamins. The main cause of folic acid deficiency is malnutrition, besides behavioral factors such as cigarette smoking, alcohol use, or the use of oral contraceptives[3]. Micronutrient deficiency, whether clinical or non-clinical, may affect growth, cognition and reproductive performance.

Many studies showed that women with mild to severe deficiency in iron- folic acid increase the risk of low birth weight, pregnancy complications and congenital defects[4]. Folic acid is very important for fetal development. After absorption, folic acid acts as a catalyst for many basic cellular reactions including the transfer of single-carbon units which is required to divide the cell during DNA synthesis[5,6].

Rapidly dividing cells in the hematopoietic system are prone to abnormalities in DNA sequences. Therefore one of the clinical manifestations of folic acid deficiency is hyper segmentation of the neutrophils followed by the subsequent production of megaloblastic marrow cells, macrocytic red cells, and finally macrocytic anemia. Anomalies in the epithelial cell division and gonadal cells follow next in this progression[7].

Spontaneous abortion in previous pregnancy was associated with increased spots and bleeding during the latest pregnancy[8]. Serum folic acid and red blood cells are the most common reliable direct indicators of folic acid status. The former reflect the current intakes of folic acid while the latter is an indicator of a long-term condition of deficiency of folic acid. Folic acid also play an important role in the early development of the red blood cells in retina[9]. Highly specific methods are available for evaluating vitamin B12 and folate status in neonates. They develop specifically through methylmalonic acid in the blood (MMA) and homocysteine (Hcy)[10].

Folate deficiency is associated with several health risks as mentioned above including cancer susceptibility and severity[11,12,13] neural tube defect (NTD), which is congenital malformation produced during the early stages of embryonic development. It cannot be closed during the first month of pregnancy. It has been proved that folic acid management before pregnancy is important to reduce its occurrence. The incidences of neural tube defects (spina bifida and brain loss) in babies are born out of mothers with at least one previous child defect increases[14,15]. Another result of folic acid deficiency is in the development cardiovascular diseases[16,17,18]. However in Libya, little information has been published on folic acid deficiency in women

during pregnancy. Therefore, the purpose of this study was to find out the prevalence of folate deficiency in pregnant ladies in Al-Jalaa Tripoli hospital outpatient department.

II. Material And Methods

Study Design: A total of 40 pregnant women participated voluntarily and were investigated in Tripoli, Libya. They had been followed up carefully through their pregnancy in Al-Jalaa Hospital OPD. The study was conducted between the periods of 25 January 2010 to 5 February 2010.
Sample size: A total of 40 random blood samples were collected in vacutainer tube and were subjected to biochemical test.
Study Location: hospital based study done in Department of General Medicine, at Al-Jalaa Hospital. Tripoli-Libya.

Study Duration: 25 January 2010 to 5 February 2010.
Sample size: 300 patients.
Requirement for blood collection
1- Disposable plastic syringe, disposable 23 G needle and 5 mL syringe
2- Specimen container – vacutainer tube (Non anticoagulant)
3- Tourniquet
4- 70 % Isopropyl alcohol
5- Sterile gauze
6- Rack to hold specimen up right
7- A puncture-resistant disposable container
8- Rubber gloves
9- Closed system `ABBOTT (MEIA) AXSYM.
Blood collection
Blood collected to obtain serum for testing folic acid was delivered into the sterile vacutainer and allowed to clot at room temperature. Then the clot loosened gently from the container wall. The tubes were centrifuged for 5 min at 3000rpm and the supernatant was pipetted into another tubes and then stored at -20°C until analyzed in the Central Hospital, Tripoli. Concentration of Folic acid was determined by closed system `ABBOTT (MEIA) AXSYM.
Statistical analysis
Data analysis was performed on computer software (Excel 2007) and the prevalence data for folic acid deficiency were presented as a percentage.

III. Result

The range of serum folate levels were (2.73 -20) ng/ml. Out of 40, 5 women (12.5%) were found to be deficient in folate level, while 35 women (87.5%) were normal as shown in Table I & Figure I.

Table no 1. Number of pregnant women in relation to folic acid deficiency

	Folate Deficiency	Normal	Total
Numbers	5	35	40
%	12.5%,	87.5%	100%

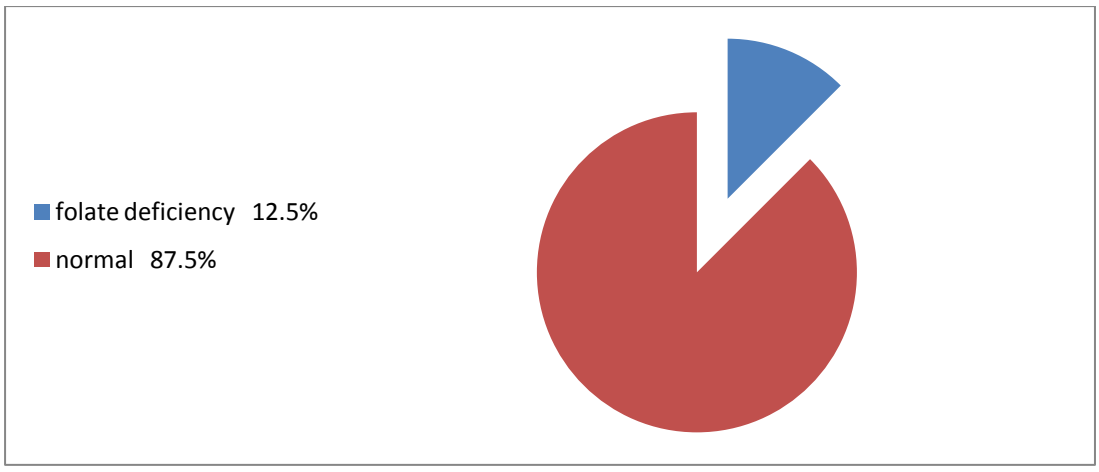

Figure 1: Prevalence of folate deficiency

Scheme of study according to age

A total of 40 pregnant women were enrolled in Central hospital, Tripoli, and were divided in groups according to their age as shown in Table II

Table II. The prevalence of folic acid deficiency in pregnant women according to age.

S. No	Age (Years)	Number of Volunteers	Folic acid deficiency	Normal
Group I	20 – 29	23	13 %	87%
Group II	30 – 39	13	0	100%
Group III	> 40	4	50%	50%

Scheme according to the gestational age

Two women were in the first trimester of pregnancy (8 - 13 weeks), four women in the second trimester (14 - 26 weeks), and thirty four women in the last trimester (27 - 40 weeks) of pregnancy (Table 3). The incidence of folic acid deficiency in relation to the period of gestation is presented in Table III.

Table III. The prevalence of folate deficiency in relation to the gestational age

	Folic acid deficiency	Normal
First trimester	0 %	100 %
Second trimester	0%	100 %
Third trimester	8.8 %	91.2%

IV. Discussion

Folic acid deficiency is prominent health issue in several countries of the world. The prevalence of the deficiency showed a significant difference between countries[19]. At present, folic acid level less than has 4.8 ng/mL in the diagnostic test, confirms folic acid deficiency. In the present study it was found that only 12.5% of the sample showed folate deficiency. This can be accounted to the fortification programs. The rate is low as compared to other studies conducted in Asian countries for example India (41.6 %), Followed by South Malawi 34%[20], Thailand (15 %) and Myanmar (13 %)[21, 22].

The reason for this high prevalence of folic acid deficiency can be attributed to inadequate or insufficient dietary intake. In UK megaloblastic anemia due to folic acid deficiency occur only in 0.5% t 4in pregnant women after prophylactic therapy with folic acid [23] . Our study proved and showed that all women treated with folic acid were normal and 50% of the women were folic acid deficient who was not treated with folic acid supplement. There is no significant effect of age on folic acid status. The other finding of the study was that the level of folic acid was normal in 100% subject during the first and second trimester of pregnancy and during third trimester folic acid deficiency occurred at a rate of 8.8%.

V. Conclusion

In this study the prevalence of folate deficiency was in 12.5 % sample. All of the women treated with folic acid had normal folic acid level. There was no significant effect of age on folic acid level. The finding showed that the majority of deficiencies of folic acid were only in third trimester.

Further studies are required to evaluate the rate of folic acid deficiency in other cities of our country with large survey and more accurate method. Every pregnant woman should be encouraged to attend the clinic periodically in order to perform necessary tests on folic acid and even if hemoglobin level is normal. Prophylactic folic acid therapy is necessary to avoid folic acid deficiency in pregnant women and they are supposed to have diets containing adequate amount of folate.

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Aboajila.M.Alfalos, et. al. "The prevalence of folate deficiency in pregnant women in Al Jalaa Tripoli Hospital outpatient department." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 20(02), 2021, pp. 14-17.