

## **Effect of supplementary folic acid intake for pregnant women on the newborn birthweight**

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### **Abstract**

**Back ground** During pregnancy the woman needs a good nutritional status for a healthy outcome. Poor nutritional statuses cause higher risks of malnutritional diseases and deaths for women and their embryos. Folic acid deficiency negatively affects pregnancy outcomes due to its association with DNA synthesis, and since the folic acid intake during pregnancy plays a significant role in modulating gene expression, the dose and its timing during pregnancy may be critical.

### **This study:**

The study was designed to investigate the effect of folic acid on pregnancy. A total of 92 pregnant women participated in this study. These pregnant women were classified into 3 groups according to their ages (20 – 30 years, 31 – 41years, and above 40years). The three groups were examined through a questionnaire that has to be answered by the pregnant women themselves.

**Result**

The majority of woman were among the first age group (20- 30 years), whereas the highest percentage of diabetic women were in the last group (above 41 years). Birthweights were higher if the woman who took folic acid during pregnancy especially if they were diabetic. In fact, diabetic women that did not take folic acid during pregnancy had the lowest birthweights compared to all other groups.

**Conclusion**

The data suggested that taking folic acid supplementation helps in developing the fetus and thus the newborn baby will have a normal birthweight. Diabetic women showed that the average birthweights of their newborn babies were higher than the normal when they took folic acid and lower than normal in the absence of the supplementary folic acid.

*Key words: Folic acid, pregnant woman, birthweight*

**Introduction**

During pregnancy the woman needs a good diet for a healthy outcome. Women with unappropriated diet at conception are at higher risk of disease and death (1). Theoretically, there are strong reasons to believe that folic acid deficiency negatively affects pregnancy outcomes due to its association with DNA synthesis. folic acid (FA) deficiencies in the per-conceptional period (three months before and after conception) are associated with a higher prevalence of birth defects and mental retardation (2). During pregnancy, FA supplementation is required to increase the expansion of maternal blood volume and growth of the fetus (3). FA intake during

pregnancy and during daily life plays a significant role in modulating gene expression and disease related outcomes, the dose, timing (pre-conceptional in-pregnancy), and source of FA supplementation during pregnancy and throughout the life time may be critical (4). Birth defects are one of the major burdens in the human public health. The Centers for Disease Control and Prevention (CDC) estimation is about 1 birth defect in every 33 newborns in the US and accounting for more than 20% of all infant mortalities (3,4). Neural tube defects (NTDs) are common complex multifactorial disorders in the neurulation of the brain and spinal cord that

occurs between 21 and 28 days after conception in humans (5)

A possible relationship between FA deficiency and increased incidences of prematurity was suggested as early as 1944 by Callender (6). Over the years, numerous studies including community-based trials often suggested NTDs as vitamin deficiency disorders and have shown that the exogenous or per-conceptional supplementation of maternal FA can reduce the risk of NTDs in the offspring (7). In 2016, World Health

**This study:**

This study was designed to investigate the effect of supplementary FA on the pregnancy outcomes. Pregnant women in this study were classified into three age groups. The first age group contains women aged from 20 to 30 years, The second age group contains women aged from 31 to 41 years, and the last age group contains women aged above 41 years. Women in each group were examined by a questionnaire that has to be answered by the pregnant women

Organization (WHO) recommends that pregnant women should take FA supplements at 400 g/day, ideally before pregnancy, in order to prevent maternal anemia, puerperal sepsis, low birthweight (LBW), and pre-term birth (8). The epidemiologic studies have observed that diabetic women using folic acid-containing supplements had a lower risk of spina bifida than non-supplementing diabetic women (16).

themselves. To ensure that random data sample was collected, pregnant women at different hospitals and clinic were contacted including Al-Zawia Educational Hospital, BorjJanzour medical Clinic, SabrathaGeneral Hospital, SoukraClinic, and The Libyan - foreign Medical Centre. A sample of 92 pregnant women were contacted and questionnaire was handed to them and each question was explained to them.

**The aims of study:**

1- Investigate the presence of folic acid supplementation before and during pregnancy.

2- Investigate the appropriate durations and doses of supplementary FA before and during pregnancy.

3- Investigate the effect of supplementary FA on pregnancy of diabetic women and the newborn birthweight.

**Questionnaire:**

This study was carried out by examining the impact of folic acid (vitamin B9) on pregnancy through pregnant women questionnaire. This questionnaire was

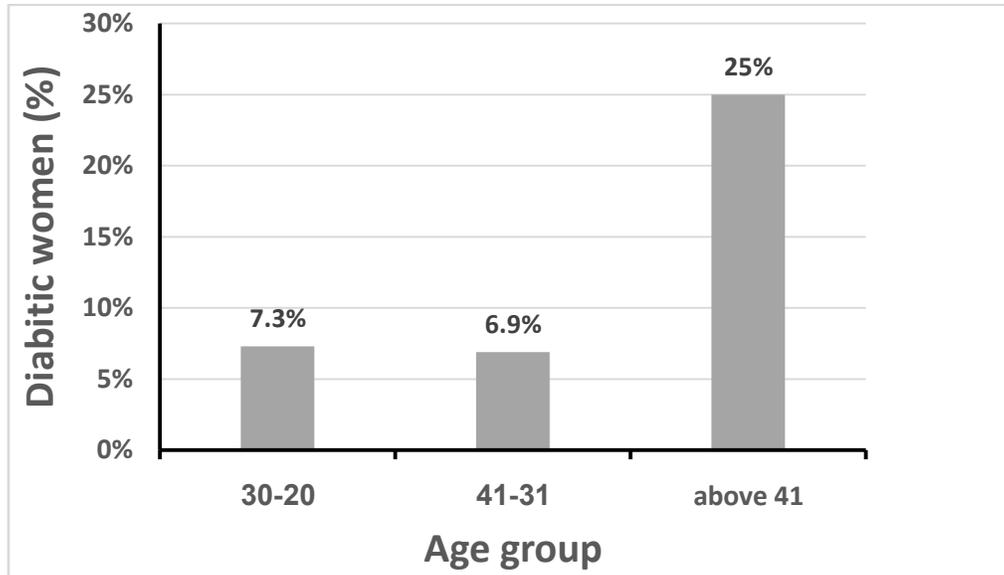
adopted from previous similar studies in different countries. It consists of 6 main questions that were answered by pregnant women.

**Result:****Data collection:**

The data of all the 92 women were collected between January and September 2018 by contacting them in Alzawia Educational Hospital, Alzawia Crescent Clinic and Borj Janzour Medical Clinic, February 17<sup>th</sup> Clinic, Alzawia Soukra Clinic, Sabratha General Hospital and Alzawia Libyan-Foreign Medical Centre.

**Distribution of Diabetes Among Different Age Groups**

Among all the 92 women, less than 10% are diabetic, and the highest percentage of diabetic women was observed among the age group above 41 years old. There were two diabetic pregnant women from a total of eight (25%), whereas there were 4 diabetic pregnant women from a total of 55 women in the first group aged 20 – 30-year (7.3%), and two diabetic pregnant women from a total of 29 in the middle age group 31 – 41-year (6.9%) respectively as shown in figure 1.



**Figure1: Diabetic women among different age groups.**

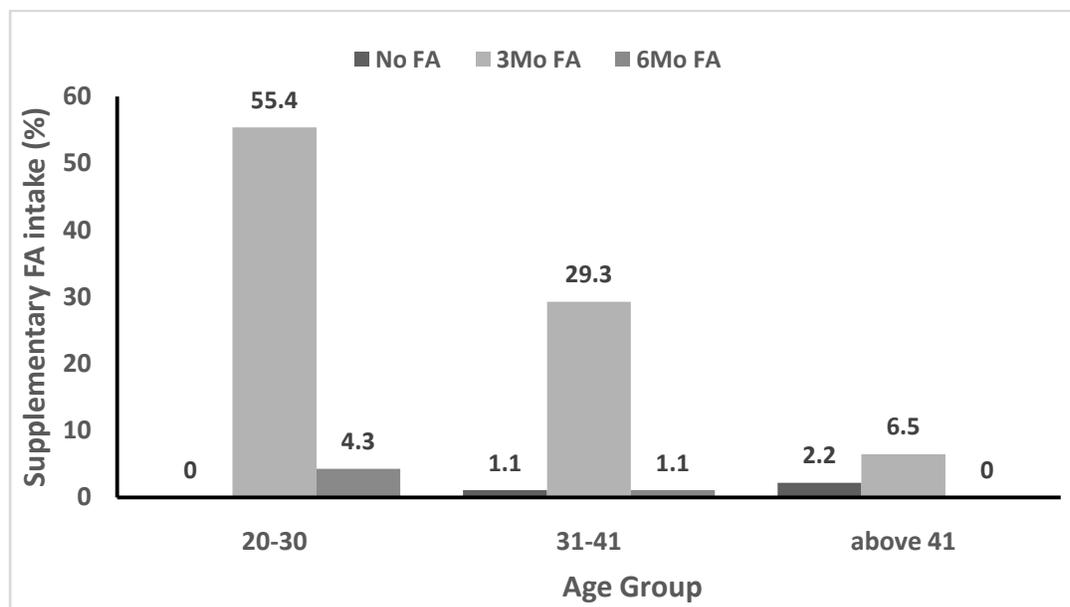
The data was expressed as the percentage of diabetic women in each group. The first group is the young pregnant women aged (20 -30) years with 4 diabetic women from a total of 55 pregnant women (7.3%). In the

second age group 31 to 41 years old, 2 diabetic women from a total of 29 pregnant women (6.9%). In the last age group above 41 years old there were 2 diabetic women from a total of 8 pregnant women (25%).

#### **Duration of supplementary folic acid intake / months: -**

All of the 20 – 30 years age group took supplementary folic acid for at least for 3 months, whereas in the other two groups, some women did not take supplementary folic acid during their pregnancy. The majority of women in all groups took

supplementary folic acid for 3 months, while a lower percent took it for 6 months. Women who are older than 41 seem to be less interested in taking supplementary folic acid. Furthermore, this group contains less than 10% of the total



**Figure 3: Folic acid administration for pregnant women among different age groups.**

The data was expressed as a percentage of the total sample. All of the 20 – 30 years group took folic acid at least for 3 months, whereas in the other two groups, some pregnant women did not take folic acid

during their pregnancy. The vast majority of women in all groups took folic acid for 3 months, while a lower percent took it for 6 months.

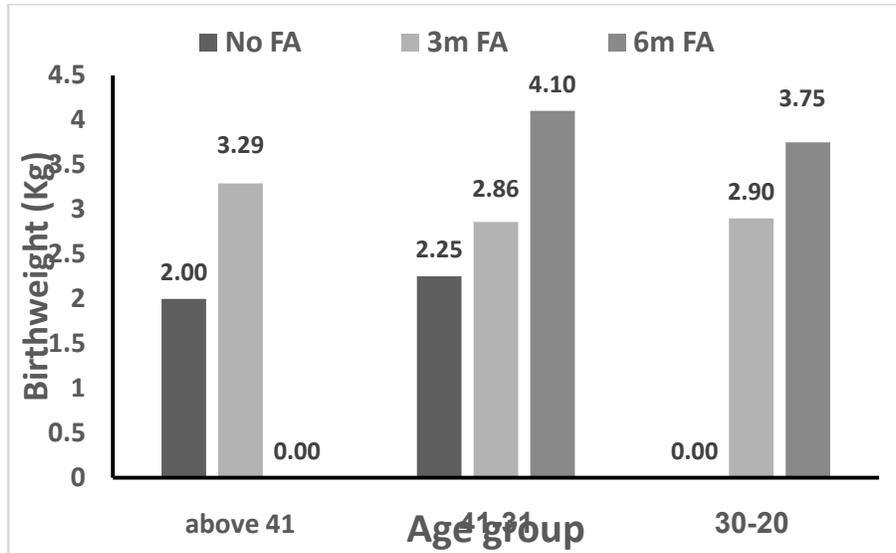
#### **Effects of FA intake on the birthweight of babies among different age groups: -**

The Highest birthweight average was in the 31 – 41 years age group who had taken supplementary FA for 6 months (4.1Kg), whereas women above 41 years old who did not take supplementary FA during pregnancy had the lowest birthweight average (2 kg). None of the women in the group above 41 years old took supplementary FA for 6 months during pregnancy, whereas all the women in the age

group 20 – 30 years old took supplementary FA either for 3 months or 6 months. The average birthweights of 20 – 30 years old age group were 2.9 kg for women with 3 months supplementary FA and 3.75 kg for women with 6 months supplementary FA. The average birthweights of 31 – 41 years old age group were 2.25 kg for women who did not take supplementary FA, 2.86 kg for women with 3 months supplementary FA

and 4.1 kg for women with 6 months supplementary FA. The average birthweights of above 41 years old age group were 2 kg

for women who did not take supplementary FA and 3.29 kg for women with 3 months supplementary FA. See figure 2 for details.



**Figure 2: Effect of duration of usage of supplementary FA on birthweights in different age group:**

The data was expressed as the average birthweight. The data showed that supplementary FA resulted in heavier

birthweights, whereas not taking supplementary FA resulted in lighter birthweights.

### Discussion

Pregnant women are recommended to take folic acid supplements to reduce risk of congenital defects, which may affect their pregnancy causing low birthweight. Lack of supplementary FA intake during pregnancy can also lead to future health complications, including diabetes, high blood pressure, obesity, heart disease, and dysfunction of mental activities (10). A study of modern scientific, published in the International

Journal of diseases and Gynecologists (BJOG) suggested that the optimal time to take supplementary folic acid is before pregnancy in order to reduce the risk of injury and distortions for the newborn at birth (9,10). It has been shown that low serum levels of folic acid and Vitamin B12 had negative impact on fetal birth weight by affecting the normal placental development (11). The recommended dose of FA is 400

micrograms per day, from at least one month before pregnancy to prevent birth defects, and to promote healthy growth of cells (12). This study has shown that diabetic pregnant women who did not take folic acid at all had newborn with low birthweight therefore, this study agrees with previous studies in which folic acid is essential for normal fetal growth. It has been observed that obese diabetic pregnant women had babies with higher birth weight (12,13), In agreement with this study where diabetic pregnant women aged between 31-41 years old and took FA supplementation for six months had babies with heavier birthweights (more than 4 kg). Younger diabetic pregnant women on

### **Conclusion**

Folic acid (vitamin B9) is essential for good health for both the pregnant women and their embryos. It aids in producing red blood cells, and is also crucial during the first few weeks of pregnancy to help the baby's brain and spinal cord develop. Supplementary

the other hand who were under age of 30 years old and also took FA supplementation for six months had babies with lighter birthweight (3.75 kg). The birthweight of babies from non-diabetic pregnant women aged between 31-41 is also lighter than that of babies from diabetic pregnant women in the same age group. so, it seems that maternal age at pregnancy particularly near the end of their reproductive lives (older than 40 years) has contributory effect along with diabetes mellitus on having babies with low birthweight. The average birthweights of all Women who took supplementary FA for 3 months from all the three age groups seem to be very close to each other.

folic acid is very helpful in insuring that both the pregnant woman and her embryo do not suffer from FA deficiency. Young women are more concerned about FA supplementation than the older women during their pregnancies.

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