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Research Article,

Effect of Iron and Folic Acid Supplementation on Pregnancy Outcome at Benghazi, Libya

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Abstract:

The aim of the study to assess the effect of iron and folic acid intake during pregnancy on maternal and neonatal health status at delivery at El-jomhoria hospital in Benghazi 2013.

Material and methods: a Descriptive cross-sectional study of delivered mothers at Al-jomhuria hospital in Benghazi during 2013. The sample size was 203 delivered mothers.

Results: The study revealed that 90.6% of pregnant women received folic acid and 89.7% iron. The study reported a significant effect of iron intake on maternal health status at delivery (odds ratio= 5.9, CI (1.3-26.7). Also, the study reported a significant relation between the incidence and type of congenital anomalies and folic acid intake during pregnancy (X_2^2=9.8 & P=0.007), while reported no significant relation with iron intake**.**

Conclusion: iron and folic acid supplementation can reduce maternal and child complications at delivery and neonatal period. The study recommends pre-pregnancy folic acid intake and iron and folic acid supplementations for every pregnant woman to prevent congenital anomalies and maternal and child complications during delivery.

Key words: Anemia, Folic acid, Iron, supplementation, Pregnant women, Child Health Status, Congenital Anomalies.

Introduction:

It is estimated that more than 40% of pregnant women worldwide are anemic. At least half of this anemia burden is assumed to be due to iron deficiency. Pregnant women require additional iron and folic acid to meet their own nutritional needs as well as those of the developing fetus. Deficiencies in iron and folic acid during pregnancy can potentially negatively impact the health of the mother, her pregnancy, as well as fetal development (1). Iron deficiency anemia is the most common nutritional disorder in the world. Iron supplementation during pregnancy has been recommended for women in the developing world (Pena and Rosas 2006) (2). Because pregnant women are at high risk of iron deficiency anemia because of significantly increased iron requirements during pregnancy; failure to meet increased iron requirements during pregnancy (Beard JL, 2005) (3). Beside to the inadequate intake of micronutrients, particularly iron, closely spaced births allowing inadequate time for maternal repletion, and infections (e.g. Malaria, hookworm, HIV, diarrhea) that destroy red blood cells, interfere with red blood cell formation, increase blood loss and/or deplete nutrient uptake (Van den Broek NR et al,1998)(4).

Iron deficiency anemia is a risk factor for perinatal complications like pre-eclampsia, low birth weight, prematurity and perinatal mortality (5). Earlier studies have provided strong evidence to show that iron supplementation with or without folic acid results in a significant reduction in the incidence of

anemia during pregnancy.(6,7). Recently it has been shown that iron supplementation during pregnancy can also help reduce perinatal mortality (8). On the other hand, folate, (the naturally occurring form) or folic acid (the synthetic form) which is a member of the water-soluble B complex vitamins are another cause of anemia during pregnancy (*Eichholzer M*, 2006)(9). Inadequate folate intake during pregnancy has number of negative health outcomes in humans including Neural Tube Defects (ntds) (*De Wals P* et al, 2007)(10), cleft lip and/or palate, low infant birth weight, abruptio placenta, pre-eclampsia, spontaneous abortion, stillbirth, macrocytic anemia, cardiovascular disease and neuropsychiatric disorders (Badovinac RL et al, 2007)(11). Folate deficiency is much less common than iron deficiency; however, taking 0.4 mg/d to reduce the risk of neural tube defects is recommended to all women contemplating pregnancy (Laurence KM, eta 1981)(12). Patients with history of neural tube defect should take 4 mg/d. An increase in MCV (typically > 100Fl) can be suggestive of folate deficiency and determination of serum levels of folate is obligatory. If the level of folate is low, the patient may require oral folate at a dose of 1mg 3 times a day. Folate is involved in the formation of new cells and in the metabolism of ribonucleic acids (RNA) and deoxyribonucleic acids (DNA), essential for protein synthesis, formation of blood and transmission of genetic code. In addition it is essential during pregnancy to reduce the risk of neural tube defects (*Shane B, 1995) (13).* The aims of the present study to find out the relationship between iron and folic acid intake during pregnancy and maternal and neonatal health status at delivery and to assay health state of mother in relation to iron and folic acid supplementation during pregnancy.

Subject and methods:

A descriptive cross-sectional study of delivered mothers at El-jomhoria hospital in Benghazi. The sample size was two hundred and three delivered mothers. The study carried out from 20/ 11/ 2012 to 31/1/ 2013). A structured interview pre-coded questionnaire was used to collect data on: Complete personal history (age, occupation, number of children, number of abortions, and history of neonatal death. Past medical history of anemia and any previous medical problems (hypertension, diabetes, heart problems and endocrine problems) was also included. History of folic acid consumption before planning pregnancy and during first trimester of pregnancy and how much the dose was, as well as the history of iron replacement during pregnancy and when she started it and the frequency of administration. Besides to the method of delivery; normal or cessation section, the weight of baby and the general heath state. Nutritional history of the mother especially for milk, meat, fruits and vegetables was also questioned. Data was analyzed by use of SPSS program version 25.

Results:

Sample size was 203 delivered mothers at Al-jomhuria hospital -2013.The mean age of mothers was 31.0±6.1 years. The minimum age was 17 years and the maximum were 45 years. The study revealed that more than half (53.7%) of the mothers' age was between 28-37 years. The study reported that 67% of the mothers were housewife (H/W), 28% were working women and 5% were students. The study revealed that 57.6% of the mothers had 1-5 children and 12.8% had > 5 children (table1).

The study revealed that 89.7% and 90.6% of the delivered mothers at Al-jomhuria hospital in Benghazi were taken iron and folic acid supplementation regularly respectively. The current study revealed that 70.1% of new-borns had normal birth weight (2.5-3.99kg) figure (1). The study revealed no significant relation between iron and folic acid intake and birth weight of the newborn babies where (X_3^2= 1.31&P =0.727, X_3^2=4.38&P =0 .22 respectively). The study revealed that 121(91.7%) of pregnant mothers who had taken folic acid and 119(90.2%) who had taken iron supplementation with normal birth weight (2.5-3.99kg) (figure 1&2). About the neonatal morbidities the present study revealed that about 20 (9.9%) of neonates were admitted to nursery , 7(31.8%) due to respiratory distress, 5(22.7%), 2(9.1%) congenital anomalies, 1(4.5%) hypoglycaemia, 1(4.5%) cardiac disease, cord around neck, 1(4.5)placental separation , 1(4.5) post-partum bleeding , 1(4.5%) maternal anemia, and1(4.5%) maternal disease (figure2). The study revealed that there was a significant inverse relation between folic acid intake during pregnancy and congenital anomalies. The study reported that133 (96.4%) of neonates had no congenital anomalies at birth and 5 (3.6%) had congenital anomalies. Among those who did not take folic

acid 2(11.1%). Had congenital anomalies as compared to 3 (2.5%) who had taken folic acid during pregnancy, X^2_2= 6.6 & P=0.03.

The study also revealed that there was a significant relation between types of congenital anomalies and folic acid intake where X_2^2=9.8 & P=0.007. The study reported no significant relation between types of congenital and iron intake where Fisher's exact test P= 0.46(table 3). The study reported that 181 (89.2%) of the neonates was healthy alive and 22 (10.8%) had complications. Head and cardiac congenital anomalies represented 6 (3.0%) and 2 (1.0%) of the neonatal deaths respectively. While, 2(1.0%) of deaths due to cord around the neck, 1(0.5%) intestinal obstruction, 2 (1.0 %) complications in the lung and respiratory distress, 2 (1.0%) oligohydramnios, 1(0.5%) polyhydramnios , and 3 (1.5%) maternal diseases (2 hypertension & 1 diabetes)(table 2). The present study found a significant relation between maternal health status at the time of delivery and iron intake during pregnancy (odd ratio= 5.9, CI (1.3-26.7) (Figure 7). It was found that 177 (97%) of mothers who took iron during pregnancy were well at the time of delivery and only 3% were unhealthy despite taking iron supplementation. On the other hand, 14% of those women who didn't take iron supplementation were unwell at the time of delivery. The present study reported no significant relation between maternal health status at the time of delivery and folic acid intake during pregnancy (table1).

Table (1): Socio-demographic characteristics of the respondent mothers delivered at Al-jomhuria hospital Benghazi -2013

Maternal socio-demographic characteristics	Number	Percent
1 Current Age /years		
a) 17-27	61	30.0
b) 28-37	109	53.7
c) ≥ 38	33	16.3
Mean age ±SD 31±6.1years		
2 Employment:		
a) House wife	137	67.5
b) Working	56	27.6
c) Students	10	4.9
3 Parity:		
a) 1-5 children	117	57.6
b) >5 children	26	12.8
Total	**203**	**100.0**

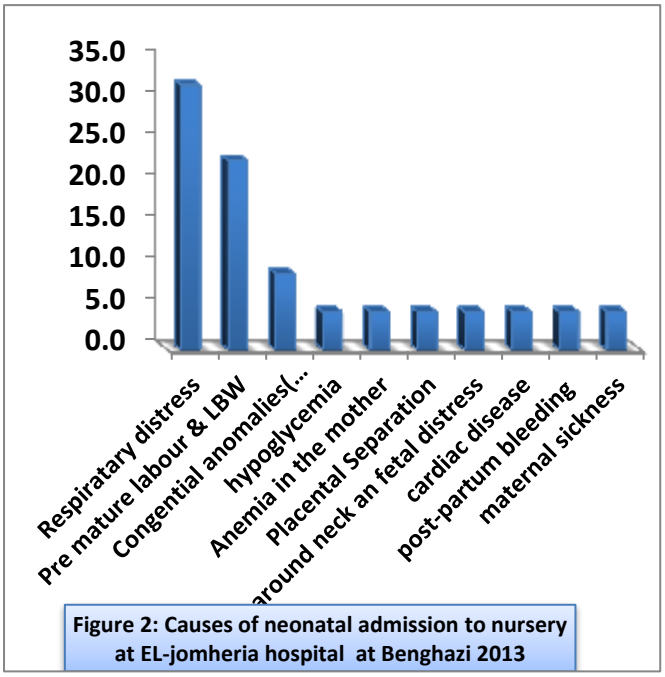

Figure 2: Causes of neonatal admission to nursery at EL-jomheria hospital at Benghazi 2013

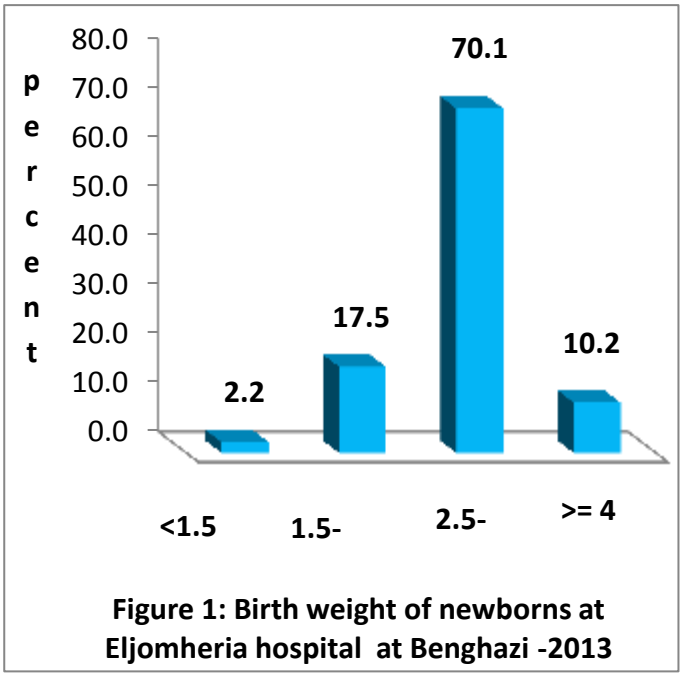

Figure 1: Birth weight of newborns at Eljomheria hospital at Benghazi -2013

Tab. (2) causes of neonatal deaths at Al-jomhuria hospital -2013 at Benghazi, Libya

Neonatal status at birth	Number	Percent
1. Alive and normal	181	88.7
2. Causes of neonatal admission to nursery :		
a) Pregnancy Complications:		
• Polyhydramnios & Oligohydramnios)	3	1.5
• Placental Separation	1	.5
b) Fetal complications:		
• Brain Congenital Anomalies	6	3.0
• Heart Congenital Anomalies	2	1.0
• Neonatal Jaundice	1	0.5
• Respiratory Distress	1	0.5
• Intestinal Obstruction	1	0.5
c) Labor Complications:		
• Obstructed labor	1	0.5
• Cord around neck	2	1.0
d) Maternal disease(hypertension, endocrine disease &DM)	3	2.0
Total	203	100.0

Table (3): Folic acid and iron intake during pregnancy and congenital anomalies among neonates at Al-jomuria hospital -2013 at Benghazi

Items	Folic A intake **Yes**	**No**	Total	0
1. Congenital anomalies :	No. (%)	No. (%)	No. (%)	
• Yes	3(2.5)	2(11.1)	5(3.6)	X_2^2= 6.6 & P=0.03
• No	117(97.5)	16(88.9)	133(96.4)	
2. Types of Congenial anomalies:				
• No Congenial anomalies	183(99)	18(95)	201(99)	
• Renal Congenial anomalies	0(0)	1(5)	1(0.5)	X_2^2= 9.8 & P=0.007
• Facial Congenial anomalies	1(1)	0(0)	1(0.5)	
Congenital anomalies :	Iron intake			
• Yes	7(3.8)	0	7(3.4)	Fisher's exact test
• No	175(96.2)	21(100)	196(96.6)	P= 0.46
Total	182(89.7)	21(10.3)	203(100)	

Table (4): Maternal health status at delivery and iron and folic acid intake During Pregnancy

Items	Maternal Health Status			
	Healthy No. (%)	Unhealthy No. (%)	Total No. (%)	Test of sig.
1. Iron Intake During Pregnancy:				
• Yes	177(91)	5(62.5)	182(90)	CI= 5.9 (1.3 - 26.7)
• No	18 (9)	3 (37.5)	21(10)	
a) Dose of iron:				
• 350 mg	163(84)	5(62.5)	168(83)	F. Exact &p = 0.03
• 150mg	14(7)	0(0)	14(7)	
• Not take	18(9)	3(37.5)	21(10)	
b) Timing of initiation of iron				X_2^2 =6.6 P=0.03
• 1st trimester	21(10)	0	21(10)	
• After 1st trimester	156(80)	5(62.5)	161(79)	
• Not taken	18(9.2)	3(37.5)	21(11)	
Total	195(100)	8(100)	203(100)	
2. Folic acid intake:				
• Yes	176(90)	8(100)	184 (91)	
• No	19(10)	0(0)	19(9)	
Initiation of folic A intake				
• Before pregnancy	12(6)	0(0)	12(6)	
• 1st trimester	162(83)	8(100)	170(84)	
• No taken	21(11)	0(0)	21(10)	
Total	195(100)	8(100)	203(100)	

Table (5): Impact of Iron and folic acid intake during pregnancy on maternal health status

	A. Iron Intake		Total	Test of sig.
Maternal complications	Yes	No		
	No. (%)	No. (%)	No. (%)	
1 No complications	176 (94)	20 (88)	196 (93)	
2 Complications	11(6)	3(12)	14(7)	
• Intra-partum Bleeding	6 (3)	2(4)	8 (3.5)	
• Convulsions & hypoglycemia	2 (1)	0(0)	3 (1)	X_8^2=26.8 P=0.001**
• Hypotension	1(1)	1(4)	2 (1)	
• Thrombocytopenia & anemia	2 (1)	0(0)	1 (0.5)	
Total	187(100)	23 (100)	210 (100)	
	B. **Folic acid Intake**			
1. No complications	164(89.1)	18(94.7)	182(94.7)	
2. Complications	20(10.9)	1(5.3)	21(10.3)	F .exact. P=
Total	184(100)	19(100)	203(100)	0.389

Discussion:

Anemia is very common disease; the current study revealed that anemia is highly prevalent during pregnancy 75-95%. Our result was in accordance with a study conducted in Jordan and reveled high prevalence of anemia in women of childbearing age (Jilani I, 1992)(14). Furthermore, a study conducted in Blantyre, Malawi on 150 pregnant women in which 32% of pregnant women were iron deficient and 26% were not iron deficient (colmerj et al 1990) (15). Additionally, our study reported that 91% of pregnant women taken iron were in good health compared to 37.5 % women who didn't take iron and were unhealthy during delivery. Furthermore, the prevalence of folic acid intake was 90.6 and 70.1% new born baby's birth weight was 2.5-3.99 kg. In further support of our results is a study conducted on 4926 pregnant women received iron and folic acid daily in south eastern plains district of Sarlahi, Nepal from 12/ 1998 to April/2001(16). The result of this study donated that iron and folic acid intake increase mean birth weight by 37 g (95% confidence interval, 16g to 90 g) and reduced the percentage of low birth weight babies (< 2500g) from 43% to 34%, (BMJ1997)(16). Furthermore, another study conducted on 21,889 women who delivered at Kilimanjaro Christian Medical Center, Tanzania between 1990- 2008. Prenatal intake of folic acid and iron supplementation was 17.2% and 22.3% of pregnant women respectively, and 16% of women reported intake of both iron and folic acid (National Bureau of Statistics (NBS) , 2005)(17). Furthermore a cross sectional survey in referral hospital in Melbourne, Australia participant pregnant women at 36-38 weeks of gestation, in this study 20% of women took pre- pregnancy folic acid supplements, 23% reported taking folic acid supplement for at least 4 weeks before pregnancy, during pregnancy 79% of women took folic acid before 13 week and 52% taking iron during pregnancy (Forster DA et al, 2009)(18). In addition double- blind clinical trial in semirural Mexico ((Martorell et al, 1998)(19) to compare the effects of multiple micronutrient supplements with those of iron supplements during pregnancy. The result of this study finding that micronutrient supplementation during pregnancy does not lead to greater infant birth size than dose iron only supplementation (Dalmiya N, 2001) (20). The present study revealed no significant relation between iron and folic acid intake and birth weight of the new-born babies where (X_3^2= 1.31&P=0.727, X_3^2=4.38&P=0 .22 respectively). The study revealed that 121(91.7%) had taken folic acid and 119(90.2%) of those had taken iron

supplementation with normal birth weight (2.5-3.99kg). Imdad A (2012)(21) found that routine daily iron supplementation during pregnancy resulted in a significant reduction of 20% in incidence of low birth weight in the intervention group compared with control. Preventive iron supplementation during pregnancy has a significant benefit in reducing incidence of anemia in mothers and low birth weight in neonates (22).

Conclusion:

Iron and folic acid supplementation can reduce maternal and child complications at delivery and neonatal period. The study recommends premarital and pre-pregnancy folic acid intake and iron and folic acid supplementations for every pregnant women to prevent congenital anomalies and maternal and child complications during delivery

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