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ORIGINAL RESEARCH

Assessment Of Anaemia During Pregnancy As A Risk Factor For Infant Iron Deficiency

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ABSTRACT

Background: Iron deficiency is a major public health problem in developed countries. The present study was conducted to assess anaemia during pregnancy as a risk factor for infant iron deficiency.

Materials & Methods:74 neonates from singleton pregnancies of either gender. 2 groups were formed. Group I were anaemic women and group II were unexposed women. The iron status of the mothers was studied 24 hours after delivery, and the iron status of the infants was studied at birth, and at the age of 3,6,9 and 12 months.

Results: 11 women developed stage 1, 3 stage 2, 2 stage 3 and 6 were normal. In non-exposed women, 16 developed stage 1 iron deficiency, 2 had stage 2, 2 had stage 3 and 14 had normal status. There were 7 cases of stage 2 and 11 cases of stage 3 iron deficiency in group I and 2 cases of stage 2 and 3 cases of stage 3 in group II. The difference was significant ($P< 0.05$). A positive association between the anaemic status of the mothers and iron status of their infants ($p< 0.05$).

Conclusion: Arelationship between iron deficiency of the mother at delivery and the development of iron deficiency in the infants was found.

Key words: Iron deficiency, infants, Pregnancy

Introduction

Iron deficiency is a major public health problem in developed countries. This condition is particularly prevalent in childhood, leading to important consequences in children's well-being, behaviour and learning processes.[1] Pregnant women are particularly vulnerable to iron deficiency due to substantial increase of iron requirement during pregnancy to support the expansion of erythrocyte mass and plasma volume, and foetal-placental growth. The World Health Organization (WHO) estimates that at least 30–40% of pregnant women are iron deficient and that nearly half are anaemic.[2]

Either anaemic or non-anaemic iron deficiency prior to and during pregnancy can have adverse consequences for both the mother and offspring, especially with respect to neonatal iron-deficient condition.[3] It was previously thought that neonate was protected from iron deficiency as the developing fetus could acquire sufficient iron from the mother even when

she was iron deficient. However, it is now evident that neonatal iron stores can be compromised when the mother is iron deficient or anaemic.[4]

Infants and young children are the most vulnerable because of low body iron stores and poor nutritional intake.[5] ID anemia (IDA) in infancy and early childhood results in long-term health consequences: impaired psychomotor development, lower educational achievement, and lower socioeconomic status.2 Thus, ID and IDA prevention should be given a high priority.[6]The present study was conducted to assess anaemia during pregnancy as a risk factor for infant iron deficiency.

Materials & Methods

The present study comprised of 74 neonates from singleton pregnancies of either gender. Inclusion criteria was gestational age of 38 weeks or more, birthweight of 2500 g or more, and without any evidence of neonatal diseases, chronic pathology during infancy or primary haematological diseases.

Data such as name, age, gender etc. was recorded. 2 groups were formed. Group I were anaemic women and group II were unexposed women. The iron status of the mothers was studied 24 hours after delivery, and the iron status of the infants was studied at birth, and at the age of 3,6,9 and 12 months. Blood samples were obtained and serum ferritin determinations were performed using the ELISA technique. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

Results

Table I Distribution of the child's ferric status by mother's status

Mother's ferric status	Child's ferric status				
	1	2	3	Normal	Total
Stage 3	11	3	2	6	22
Stage 1	10	2	1	5	18
Normal	16	2	2	14	34

Table I shows that 11 women developed stage 1, 3 stage 2, 2 stage 3 and 6 were normal. In non- exposed women, 16 developed stage 1 iron deficiency, 2 had stage 2, 2 had stage 3 and 14 had normal status.

Table II Number of cases according to the iron deficiency stage

Iron deficiency stage	6 months		9 months		12 months		Total	
	2	3	2	3	2	3	2	3
Group I	1	2	2	4	4	5	7	11
Group II	1	3	1	0	0	0	2	3

Table II shows that there were 7 cases of stage 2 and 11 cases of stage 3 iron deficiency in group I and 2 cases of stage 2 and 3 cases of stage 3 in group II. The difference was significant (P< 0.05).

Table III Association between anaemic status in the mothers and stages 2 or 3 iron deficiency in their infants

	Status	Infant		Total	OR	P value
		Anaemia	No Anaemia			
Mother	Anaemia	18	4	22	6.52	0.01

	No Anaemia	5	29	34		

Table III shows a positive association between the anaemic status of the mothers and iron status of their infants ($p< 0.05$).

Discussion

Iron deficiency is the most prevalent global nutrient deficiency and the most common cause of anaemia worldwide.[7,8] Iron deficiency represents a spectrum ranging from iron depletion without anaemia (reduced iron stores with a normal haemoglobin (Hb) concentration) to eventual overt anaemia, where the iron supply is insufficient to maintain a normal Hb concentration.[9] Pregnant women are particularly vulnerable to iron deficiency due to substantial increase of iron requirement during pregnancy to support the expansion of erythrocyte mass and plasma volume, and foetal-placental growth. The World Health Organization (WHO) estimates that at least 30–40% of pregnant women are iron deficient and that nearly half are anaemic.[10]The present study was conducted to assess anaemia during pregnancy as a risk factor for infant iron deficiency.

We found that 11 women developed stage 1, 3 stage 2, 2 stage 3 and 6 were normal. In non-exposed women, 16 developed stage 1 iron deficiency, 2 had stage 2, 2 had stage 3 and 14 had normal status. MulevicieneA et al[11] in their study patients was divided into three groups: IDA infants (IDA-In; n = 36, aged 3–11 months), IDA children (IDA-Ch; n = 23, aged 12–32 months), and healthy controls (HCs; n = 32, aged 6–34 months). There was a higher number of premature, low birth weight (LBW), and faster gaining weight infants in the IDA-In group. Their diet diversity was lower than IDA-Ch and HC. In contrast, the IDA-Ch group had no signs of impaired iron stores at birth or higher iron need for fast growth; their diet diversity was similar to that of HC, but meat was introduced later as compared with those in the IDA-In and HC groups. Consumption of cow's milk was rather low among all study participants, but consumption of sugar-added products was found to be a new emerging problem. Exclusive breastfeeding did not differ in duration and prevalence; the age for introduction of complementary foods was similar in all groups.

We found that there were 7 cases of stage 2 and 11 cases of stage 3 iron deficiency in group I and 2 cases of stage 2 and 3 cases of stage 3 in group II. Colomeret al[12] in their study a statistically significant positive association was detected with an odds ratio of 6.57 (95% confidence limits 1.81-25.97). A stratified analysis was also performed to control the effect of potential confounders such as socio-economic variables, feeding practices and other factors linked with the iron status of infants. This second analytical procedure showed no alteration in the association detected in the simple analysis but that there was a statistically significant strong interaction between the quantity of cow's milk intake and the ferropenic status of the mother. These results show a relationship between iron deficiency of the mother at delivery and the development of iron deficiency in the infants.

We observed a positive association between the anaemic status of the mothers and iron status of their infants ($p< 0.05$). Loy et al[13] examined the proportion and risk factors of iron deficiency among pregnant women in a developed Asian country. The median (25-75th percentile) plasma ferritin concentration was 24.2 (19.9–30.6) µg/L. Overall, 660 (67.0%) and 67 (6.8%) women had modest and severe iron depletion, respectively. Higher plasma sTfR was observed in women with severe iron depletion than among those with iron sufficiency (median 17.6 versus 15.5 nmol/L; $p < 0.001$). Age < 25 years (odds ratio 2.36; 95% confidence interval 1.15–4.84), Malay (2.05; 1.30–3.24) and Indian (1.98; 1.14–3.44) ethnicities (versus Chinese), university qualification (1.64; 1.13–2.38), multiparity (1.73; 1.23–2.44) and lack of iron-containing supplementation (3.37; 1.25–8.53) were associated with increased odds of modest and severe iron depletion.

The limitation the study is small sample size.

Conclusion

Authors found relationship between iron deficiency of the mother at delivery and the development of iron deficiency in the infants.

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