

Effect of Weekly versus Daily Iron and Folic Acid Supplementation on the Haematological Status of Pregnant Women

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Abstract

In many developing countries including Bangladesh daily iron and folic acid supplement is given to pregnant women through health care services but with limited success. Poor compliance, inefficiency of health care services and poor quality of supplemented tablets have been implicated for such poor outcome. Several studies reported that once or twice weekly instead of daily supplementation were equally effective with reduced gastrointestinal side effects and improved patient compliance. In this study effect of once weekly administration of 120 mg of iron and 0.5 mg of folic acid was compared with same dose of daily iron and folic acid supplementation. 600 anemic pregnant women (Hb level at or below 11.9 g/dl) at 20 weeks \pm 15 days of pregnancy were randomly selected and allocated to one of the two treatment groups. Haematological parameters (Blood Hb, MCV and MCHC) were measured at baseline and repeated at 28th week, 36th weeks of

pregnancy and at delivery. Because of significant drop out at antenatal visits, only 57 subjects (25 in daily group and 32 in weekly group) could be followed up till delivery at the hospital. At baseline, no significant differences in haematological parameters existed between the two treatment groups except for MCV, suggesting that study participants in both groups had more or less similar haematological status at baseline. With iron and folic acid supplementation from 20th week \pm 15 days of pregnancy through delivery, there had been significant improvement in both Hb level and MCV in both the groups and the improvement was not significantly different between the two groups, suggesting that both weekly and daily supplementation had similar effects. Significance of this and other findings have been discussed. Further studies with larger samples have been suggested before recommending weekly supplementation for routine use.

Introduction

The most prevalent nutrient deficiency disorder worldwide is iron deficiency anemia.¹ A large fraction of the population, particularly the women of the developing countries including Bangladesh suffer from this disorder.¹⁻³ Pregnant mothers are at special risk because of increased iron demand during pregnancy.⁴ Prevalence of iron deficiency during pregnancy in Southeast Asia is as high as 60-70%.⁵ Iron deficiency during pregnancy may be associated with poor pregnancy outcome.⁶⁻⁸ In Bangladesh pregnant women usually suffer from folic acid and other micronutrients deficiency along with iron deficiency.⁹⁻¹¹

Folic acid supplementation with iron has a strong protective effect against early neonatal death.¹² So in Bangladesh conventional daily iron and folic acid supplement is given to the pregnant women through the public health care services, but no substantial reduction in the prevalence of iron deficiency among them has been observed.⁹ Poor compliance, inefficiency of health care services and poor quality of supplemented tablets have been implicated for this poor outcome.^{9-11,13} Several studies¹⁴⁻¹⁸ have reported that once or twice weekly iron supplementation was as effective as daily iron supplementation and resulted in improved patient compliance.

The present study was therefore undertaken to investigate whether once weekly iron and folic acid supplementation is as effective as conventional daily supplementation in improving the haematological status of pregnant women.

Subjects and methods

A randomized case control study was carried out from November 2006 to July 2008 to compare the effect of weekly versus daily iron and folic acid supplementation during pregnancy at Azimpur Maternity Hospital, Dhaka.

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Study Participants:

400 anemic pregnant women (Hb level at or below 11.9 g/ dl) at 20 weeks±15 days of pregnancy were randomly selected from pregnant women attending antenatal clinic of Azimpur Maternity Hospital (AMH) and allocated to one of the two treatment groups described below after they gave informed consent and expressed the desire to have delivery at AMH. During follow up visits there were significant drop out, for which additional 200 subjects were subsequently recruited following the same criteria. i) Group A (n = 300 at recruitment) received conventional daily iron supplement (60 mg elemental iron & 0.25 mg folic acid tablet twice daily). ii) Group B (n = 300 at recruitment) received once weekly iron supplement (120 mg elemental iron & 0.5 mg folic acid tablet once weekly).

Study design:

Before the start of supplementation (at 20 weeks±15 days of pregnancy) blood haemoglobin level (Hb, g/dl), mean corpuscular volume (MCV, fl), and mean corpuscular haemoglobin concentration (MCHC, g/dl) of each participant (n=600, both groups) were measured. Then they were given iron and folic acid supplementation

with appropriate medication instructions as per their randomly assigned groups. They were asked to bring back the empty medicine foils as evidence of compliance at their next visit (28th week of pregnancy). A total of 391 subjects of both groups reported at 28th week. Their blood Hb level, MCV and MCHC were measured, fresh supply of iron and folic acid supplementation was given with appropriate medication instruction and were asked to report at 36th week of pregnancy. A total of 182 subjects (both groups) reported and received same schedule of iron and folic acid supplementation following blood examination. However a complete set of data was obtained for 57 subjects of both groups (25 in daily group and 32 in weekly group) who could be followed up till labour and delivered at Azimpur Maternity Hospital.

Statistical Analysis:

Blood Hb level, MCV and MCHC of the subjects of daily iron and folic acid supplemented group (group A) were compared with those of weekly supplemented group (group B) by Unpaired Student's 't' tests. To assess the improvement in the haematological status of treated subjects pre and end supplementation Hb level, MCV and MCHC of the study participants of both groups were compared using Paired Student's 't' tests.

Table I

Haematological values at Pre and End supplementation of Iron & Folic Acid.

Study Group	Parameters	Pre supplementation Mean ± SD	End supplementation Mean ± SD	P Value
Daily Supplemented (Group A, n-25)	Parameters	8.43 ± 0.62	8.94 ± 0.55	0.001 ¹
	Hb (g/dl)	108.1 ± 10.4	104.4 ± 5.4	0.050 ¹
	MCV (fl)	23.4 ± 1.4	23.3 ± 0.9	0.735 ^{1,ns}
	MCHC (g/dl)			
Weekly supplemented (Group B, n-32)	Hb (g/dl)	8.50 ± 0.60	8.80 ± 0.72	0.004 ²
	MCV (fl)	114.9 ± 10.8	107.5 ± 7.93	0.000 ²
	MCHC (g/dl)	23.6 ± 1.16	23.9 ± 1.31	0.197 ^{2,ns}

When Pre and End Supplementation values are compared between the groups, p values are

Parameters	Pre Supplementation	End Supplementation
Hb	p = 0.853 ^{ns}	p = 0.507 ^{ns}
MCV	p = 0.049	p = 0.088 ^{ns}
MCHC	p = 0.452 ^{ns}	p = 0.043

Results

Pre-supplementation blood Hb level, MCV and MCHC in Group A (daily supplemented, n = 25) and group B (weekly supplemented, n = 32) were 8.43 ± 0.62 g/dl, 108.1 ± 10.4 fl, 23.4 ± 1.4 g/dl and 8.5 ± 0.60 g/dl, 114.9 ± 10.8 fl, 23.6 ± 1.16 g/dl respectively (Table I). At the baseline, no significant difference existed (Hb, $p=0.853$ and MCHC, $p=0.452$) between the two treatment groups except for MCV ($p=0.049$) which in case of weekly supplemented group was slightly higher (Table 1), suggesting that study participants in both groups had more or less similar haematological status at the baseline.

End-supplementation (at delivery) blood Hb level, MCV and MCHC in Group A and group B were 8.94 ± 0.55 g/dl, 104.4 ± 5.4 fl, 23.3 ± 0.90 g/dl and 8.8 ± 0.72 g/dl, 107.5 ± 7.93 fl, 23.9 ± 1.31 g/dl respectively. No significant difference (Hb, $p=0.507$ and MCV, $p=0.088$) existed between the two treatment groups, except for MCHC ($p=0.043$), where value in group B (weekly supplemented) was slightly higher (Table 1). When pre-supplementation (at baseline) values \pm SD of Hb, MCV and MCHC were compared to end-supplementation (at delivery) values \pm SD, there had been significant increase in Hb level [P1 (pre-supplementation)=0.001, P2 (end-supplementation)=0.004] and MCV [P1=0.05, P2=0.0004]. MCHC though improved slightly, the differences were not statistically significant (P1= 0.735, and P2= 0.197; Table-1).

The results indicate that with iron and folic acid supplementation there was significant increase in both blood Hb level and MCV in both groups (group A & B), and the improvement was not significantly different between the two treatment groups, suggesting that both weekly and daily supplementation had similar effect on blood Hb level and MCV.

Discussion

The success of large scale iron supplementation programs during pregnancy particularly in developing countries has been limited for various reasons. Pregnant women of developing countries come irregularly and/or late or worse do not come to health centres for antenatal check up. Iron tablets given through national health care programs for daily ingestion throughout the pregnancy are taken

irregularly or even ignored.^{10,11,13} Lack of compliance make such health care program ineffective, even when the logistic side of a program is well organized. The compliance is mainly influenced by the undesirable gastrointestinal side effects that are related to the amount, form and also to the frequency of supplemented iron.^{19-,21} In several earlier studies¹⁵⁻¹⁸ alternate strategies like less frequent administration of iron (weekly instead of daily) have proved equally effective, reduced gastrointestinal side effects and improved compliance. In this study the effect of once weekly administration was compared with conventional daily iron and folic acid supplementation in pregnant anaemic Bangladeshi women on their haematological status. Folic acid was included in this supplementation program because of high prevalence of its deficiency in Bangladesh^{10,11}, its correlation with neonatal morbidity and mortality¹² and its inclusion in Bangladesh National Health Care program for prevention of anaemia in pregnancy. At the baseline (pre-supplementation) no significant differences in haematological parameters (blood Hb level, MCV and MCHC) existed between the two treatment groups except for MCV, suggesting that at the baseline study participants in both groups had more or less similar haematological status.

With iron and folic acid supplementation from 20 weeks \pm 15 days of pregnancy through delivery, there had been significant improvement in blood Hb level and MCV in both groups and the improvement was not significantly different between the two treatment groups suggesting that both weekly and daily supplementation had similar effect on blood Hb level and MCV. The results correlate well with those of earlier studies.¹⁵⁻¹⁸ In the present study, MCHC increased very slowly but consistently throughout the supplementation period, however the improvement was not statistically significant in either group. Since the trend is for improvement, a significant difference could have resulted if supplementation could be extended beyond delivery of baby to such a period as it was required for correction of anaemia.

Out of 300 pregnant anemic women recruited in each treatment groups at baseline, only 25 of daily supplemented group and 32 of weekly supplemented group could be followed up till

delivery, suggesting i) drop out was more in daily supplemented group, ii) hospital delivery was more (11%) in weekly supplemented group compared to daily group (8%) and iii) by implication better compliance in weekly supplemented group.

Earlier studies^{10,16} have shown that with less frequent dosing (once or twice weekly) the level of iron absorption remains high whereas with daily dosing the level of absorption decreases after a few days and the most troublesome gastrointestinal side effects will occur less frequently in case of weekly supplementation. In the present study no gastrointestinal side effects were reported from either treatment group. It would be worth investigating if gastrointestinal side effects accounted for greater drop out in daily supplementation group. Other limitations of the present study include smaller sample size (only 57 study participants in both groups could eventually be followed up till delivery), lack of monitoring of participants' nutritional status (despite the fact that the participants were from lower middle class income group) and failure to de-worm the pregnant participants (for de-worming is known to improve the haematological parameters).

Conclusion

Supplementation of pregnant women once weekly with 120 mg iron and 0.5 mg folic acid was as effective as daily supplementation with same dose of iron and folic acid in terms of blood Hb level and MCV. Weekly supplementation would be economically more advantageous and would ensure better compliance. However further studies with larger samples, preferably in both hospital and community setting, and more rigorous study design taking the limitations of the present study into consideration are required before its recommendation for routine use.

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