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Comparison of the Effectiveness of Weekly and Daily Iron Supplementation in 6 to 24 Months Old Babies in Urban Health Centers of Sari, Iran

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Abstract: The aim of this study was to compare the effectiveness of weekly and daily iron supplementation in 6 to 24 months infants. One-hundred Infants enrolled into this randomized controlled field trail. Fifteen drops was prescribed for the group who received daily supplementation of iron and 30 drops was prescribed for the group who was set up to receive weekly supplementation of iron. Hemoglobin and serum ferritin was measured after 12 weeks. After 12 weeks results showed that both weekly and daily supplementation significantly increased hemoglobin but for serum ferritin daily supplementation was only significant. However, there was no significant difference between two groups, so the weekly supplementation is recommended. According to the results and more tendencies to the weekly regimen, we recommended weekly regimen versus daily Iron supplementation.

Key words: Infant, anemia, ferrous sulfate, iron deficiency

INTRODUCTION

Iron deficiency anemia is recognized as the most prevalent nutritional problem in the world (World Health Organization, 2000). It is estimated to affect 2 billion people worldwide (Iannotti *et al*., 2006) including two thirds of infants in most developing nations (Gillespie *et al*., 1999). In Iran, the prevalence of anemia is relatively high. 10.5% of high school female students in Lar City (Vizshfar and Zarif-sanai, 1998) 7.2% of 1-5 year old infants in Kerman City (Heidarnia *et al*., 1998) and 23.8% of women in reproductive ages in Ilam City (Vahidnia, 1998) are suffering from anemia. Iron deficiency usually starts manifesting around the age of 6 months. This has been correlated to the depletion of iron stores and the introduction of complementary foods (Nagpal *et al*., 2004), it is a leading cause of morbidity and mortality world- wide. Many developing countries recommend iron supplementation for pregnant women and young infants (Lozoff *et al*., 2000). Unfortunately, compliance is reduced by the undesirable side effects of the iron supplements which are related to the dosage and formulation of the therapy. These concerns have led to studies looking at intermittent versus daily iron dosing in an attempt to identify the optimum therapeutic protocol, that achieved positive results in China (Liu *et al*., 1995), Indonesia (Schultink *et al*., 1995) and Vietnam (Thu *et al*., 1999) reducing anemia prevalence without provoking side effects such as nausea and epigastric pain by reducing the iron content in the gut on a day-to-day basis. Iron absorption is suppressed for at least 24 h after consumption of a high iron meal or iron supplement, principally by controlled suppression of intestinal mucosal cell uptake (Mumtaz *et al*., 2000). The aim of this study was to compare the efficacy of two modes of Fe supplementation, daily and twice weekly, on Fe and ferritin status at the start and end of study in infants 6 to 12 months in sari primary health care centers.

MATERIALS AND METHODS

In this randomized controlled trial, 100 infants between 6 to 24 months old who referred to Public Health Care Center in Sari, Iran in 2005 were selected. Then the infants were randomly divided in two equal groups; 50 cases in each weekly and daily iron supplementation.

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Fifteen to thirty drops of Iron supplementation were prescribed for the daily and weekly groups, respectively. Hemoglobin and serum ferritin was measured after 12 weeks. Variables such as sex, mode of nutrition and mother's education level were assessed. Data were analyzed by using SPSS (13) software and descriptive statistical tests (such as ANOVA and pair t-test).

RESULTS AND DISCUSSION

There was no significant difference as viewpoints of sex, mode of nutrition, education level of mothers and birth rank of the babies between the 2 weekly and daily Iron supplementation groups. The sex related data was equal for the both groups. Breast feeding was the most method of feeding in both studied groups. Almost all the mothers were educated with diploma certification. The distribution of the samples was uniform among studied health care centers. Also, most of the babies were the first or second rank of birth in their family members. The results of t-test showed that the Hemoglobin concentration before and after receiving ferrous sulfate drops was significant difference (Table 1).

Mean Hemoglobin concentration was increased from 12.3 ±0.8 to 12.3±1.01 mg dL^{-1} after ferrous sulfate drops prescription in both weekly and daily groups. The serum ferritin in daily group was changed significantly after using Iron supplementation (Table 2).

The before and after mean ferittin in daily group was 21.4±8.9 and 24.3±12.3 mg dL^{-1}, respectively. Iron supplementation had no significant effect on serum ferritin level in weekly group. The mean changes of serum ferittin and Hemoglobin in both weekly and daily groups was not significant differences (Table 3).

Iron deficiency anemia is one of the most common and widespread public health problems around the world. Infants, preschool children, young adult's especially young girls, women in fertility age group and pregnant women are the high risk groups. Iron supplementation is one of the most important therapeutic and preventive strategies in presence of Iron deficiency and can lead to improvement of individual function. In this study, the effectiveness of weekly and daily iron supplementation was compared among babies between 6 to 24 months old. The results of the study showed that weekly and daily iron supplementation significantly increased Hemoglobin concentration. While, serum ferittin was only increased by using daily iron supplementation. The similar results were reported by others in children with different age groups. Desai *et al.* (2004) were reported increasing hemoglobin concentration by daily iron supplementation among children 2 to 59 months and Nguyen *et al.* (2002) reported

Table 1: Hemoglobin (mg dL^{-1}) changes before and after intervention in both weekly and daily groups in studied 6 to 24 months old babies in urban health centers

	Mean±SD	
Variables	Weekly	Daily
Hb 1st	11.9±0.68	11.7±0.53
Hb 2nd	12.3±1.01	12.3±0.80
t-value	-2.930	-5.230
p-value	0.005	<0.001

Table 2: Serum ferritin changes before and after intervention in both weekly and daily groups in studied 6 to 24 months old babies in urban health centers

	Mean±SD	
Variables	Weekly	Daily
Ferritin 1st	21.3±16.09	21.4±8.90
Ferritin 2nd	21.4±15.90	24.3±12.3
t-value	0.004	-12.130
p-value	0.900	0.038

Table 3: Comparing the effectiveness of weekly and daily iron supplementation on hemoglobin and serum ferritin indexes after completing the therapeutic period 6 to 24 months old babies in urban health centers

	Indexes	
	Mean±SD	
Variable group	Ferritin	Hemoglobin
Daily	2.8±9.5	0.59±0.79
Weekly	8.0±12	0.35±0.85
t-value	1.28	46.11
p-value	0.20	140

the similar results in infants between 5 to 12 months. In addition, Hall *et al.* (2000) were reported comparable results in school age children between 6-19 year old. None the serum ferritin in weekly group was not significantly increased in this study that was like Sungthong *et al.* (2002) results. Present results showed that there was no significant difference in increasing of serum ferittin and hemoglobin concentration in weekly and daily iron supplementation group. On the other hand, the weekly iron supplementation can be a better choice with lower side effects. Tavil *et al.* (2003) in a study on 5 months to 6 year old children in Turkish found no significant differences between two daily and weekly groups and similar results was reported by Sungthong *et al.* (2002) on school age children in Thailand. Nguyen *et al.* (2002) confirmed using of iron supplementation until 6 months of life and recommended continuing of weekly regime in until 15 months of life. Shah *et al.*(2002) and Sungthong *et al.* (2002) in their studies recommended using weekly iron supplementation among teenage girls. Desai *et al.* (2004) found that daily iron supplementation had better results than weekly regime to improving of hemoglobin concentration in children who live in Malaria source area in Kenya. The base of this study and similar survey on

pregnant women and other groups such as non-pregnant women children under than 2 year and preschool age children as an aim groups, was Mucosal Block Theory. According to this theory, the first dose of Iron causes TIBC Saturation by intestinal epithelial cell and inhibition of further doses absorption. If the intestinal epithelial cells detach and replace by the new epithelial cells, the further doses will be absorbed after 5 to 6 days later. Study with isotope iron confirmed this theory in animal but it is controversial in human.

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