



Effect of Ferrous Fumarate Supplementation and Date (*Phoenix dactylifera*) Consumption on Hemoglobin Level of Women in the Third-Trimester of Pregnancy

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Abstract

Background: Anemia during pregnancy may lead to serious maternal and fetal complications such as miscarriage, preterm birth and post-partum hemorrhage. This study aimed to determine effects of ferrous fumarate supplementation alone and combined with date consumption on hemoglobin levels in women in the third trimester of pregnancy.

Methods: This quasi-experimental study was done on all pregnant women in third-trimester of pregnancy who were referred to the Puteri Ayu Public Health Center in Jambi, Indonesia in 2019. Overall, 60 participants were enrolled via convenience sampling. The subjects were divided into two groups of ferrous fumarate supplementation alone (n=30) and ferrous fumarate supplementation combined with date consumption (n=30). Data were analyzed using the paired t-test and independent t-test at 95% confidence interval.

Results: Ferrous fumarate supplementation significantly increased hemoglobin levels in the subjects (P=0.000). However, the combined use of ferrous fumarate and dates was more effective in increasing hemoglobin levels in the subjects (P=0.000).

Conclusion: Our results suggest that consumption of dates alone or combined with ferrous fumarate supplementation could be recommended to pregnant women in order to prevent or control anemia during pregnancy.

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Highlights:

What is current knowledge?

Anemia during pregnancy may lead to serious maternal and fetal complications and some interventions had examined to prevent it.

What is new here?

Consumption of dates alone or combined with ferrous fumarate supplementation could be recommended to pregnant women in order to prevent or control anemia during pregnancy

content (7.2 mg/100 g date) (12). In addition, 100 gr of date contain 5.2% crude fiber and minerals, such as calcium (65 mg), phosphorus (72 mg), potassium (521 mg), magnesium (20 mg) and selenium (0.34 mg). Dates also contain vitamin A (0.04 mg), vitamin B1 (0.08 mg), vitamin B2 (0.05 mg) and nicotinic acid (2.20 mg) (13).

Although numerous studies have investigated the effect of ferrous fumarate supplementation on hemoglobin levels in pregnant women, there is insufficient data on the effect of date consumption on hemoglobin levels, particularly in the third-trimester of pregnancy. Therefore, this study aimed to compare effects of ferrous fumarate supplementation alone and along with date consumption on hemoglobin levels of women in third trimester of pregnancy.

Methods

This was a quasi-experimental study with a pretest-posttest design. Study population consisted of all pregnant women in third-trimester of pregnancy who were referred to the Puteri Ayu Public Health Center in Jambi (Indonesia) for antenatal visits during April and November 2019.

Inclusion criteria were as follows: being in the third trimester of pregnancy, a minimum upper arm circumference of 23.5 cm and having no dietary restriction on iron sources (plant and animal protein). Those who consumed tea and coffee during the study, had serious diseases/infections and were active smokers were excluded from the study. Overall, 60 participants were enrolled in the study via convenience sampling. The subjects were then equally divided into two groups of ferrous fumarate supplementation alone and ferrous fumarate supplementation combined with date consumption.

Hemoglobin level was determined using the Sahli Haemometer at baseline and after consumption of dates. The subjects in the combined group consumed three pieces of Sukari dates a day for seven days. The type of date was selected based on the subjects' preference.

Data were expressed as mean \pm standard deviation (SD). Analysis of data was performed in SPSS 16 using the paired t-test and independent t-test and at significance of 0.05.

Introduction

Maternal mortality is widely acknowledged as a general indicator of the overall health of a population, of the status of women in society, and of the functioning of the health system (1). According to the World Health Organization (WHO) report in 2015, the prevalence of maternal mortality was 239 per 114100 million live births in the least developed countries and 15 cases per 100 million live births in developed countries (2). According to the Indonesia Demographic and Health Survey, the MMR in Indonesia was 305 per 100,000 live births in 2015 (3). This high MMR in Indonesia is inseparable from complications that occur during pregnancy, childbirth and the puerperium. The most common causes of maternal mortality are thought to be bleeding (28%), eclampsia (24%) and infection (11%). Nutritional problems arising from anemia in pregnancy and chronic energy deficiency are some indirect causes of maternal mortality (4). Anemia during pregnancy remains an important public health problem in Indonesia as about 49% of pregnant women in the country experience anemia during pregnancy (4). Previous studies have well-demonstrated the increased risk of maternal mortality associated with anemia in pregnancy (5, 6), highlighting the need for immediate and effective prevention programs against the condition (7). Daily ferrous fumarate supplementation is a commonly used pharmacological therapy for anemia during pregnancy, while consumption of dates (*Phoenix dactylifera*) is suggested as a non-pharmacological alternative owing to the high iron, vitamin B12, vitamin C and folic acid content (8-11). A study reported that Ajwa dates contain less iron (0.85 mg/100 g date), while Tunisian dates have the highest iron

Results

The mean age, mean gestational age and number of parity of subjects were 26.33±6.13 years (range: 18-38 years), 33.30±3.67 (range: 28-39 years) and 2.20±1.00 (range: 1-5), respectively.

As shown in [table 1](#), hemoglobin level in pregnant women increased significantly after ferrous fumarate supplementation (P=0.000).

Hb	n	Mean±SD	Min	Max	Difference ±SE	P value*
Before	30	10.29±0.993	8.4	12.6	0.69±0.248	<0.001
After	30	10.98±0.928	9.5	13.1		

*Paired t test

The simultaneous use of ferrous fumarate and dates also resulted in a significant increase in hemoglobin level of pregnant women (P=0.000) ([Table 2](#)).

Hb	n	Mean±SD	Min	Max	Difference ±SE	P value*
Before	30	10.25±0.957	8.4	12.6	1.58 ±0.242	<0.001
After	30	11.83±0.920	9.3	12.7		

*Paired t test

[Table 3](#) shows the effects of ferrous fumarate supplementation alone and combined with dates consumption on the hemoglobin level of pregnant women.

Table 3. Table of effects of consumption of Fe and Fe with dates on hemoglobin levels

Hb	n	Fe		Fe and Dates		P value**
		Mean ± SD	n	Mean ± SD	n	
Before	30	10.29±0.993	30	10.25±0.957	30	0.001
After	30	10.98±0.928	30	11.83±0.920	30	
P value*		<0.001		<0.001		

*Paired t test

** Independent t test

Discussion

In line with previous findings, our results indicated a significant increase in hemoglobin level of pregnant women following ferrous fumarate supplementation. Ferrous fumarate tablets contain 30-60 mg of iron and 400 mg of folic acid that could increase hemoglobin level in pregnant women. As part of the anemia control program implemented by the Indonesian government, pregnant women should be supplemented with 90 ferrous fumarate tablets during the pregnancy period ([14](#)).

Iron deficiency is one of the main causes of anemia. Iron is a major component of hemoglobin in red blood cells that determines the amount of oxygen carried in the blood. Iron can also inhibit the activity of hyaluronidase in the process of hyaluronic acid break down, which is a key component of the bone marrow extracellular matrix ([15](#)).

Previous studies have shown that consumption of dates can increase hemoglobin level in rats with anemia ([16-18](#)). Date is a rich source of iron, and its protein, carbohydrate and fat content supports hemoglobin synthesis ([16](#)). It has been reported that taking iron tablets twice a week for two months can increase hemoglobin levels by 0.99 g/dl ([17](#)). In the present study, combined use of dates and ferrous fumarate significantly increased hemoglobin levels in pregnant women. Dates have been a staple food of the tropics. Consuming 100 grams or approximately 5-7 dates for 14 days can help increase hemoglobin level in the blood ([16](#)).

In another study, consumption of date extract significantly increased the number of red blood cells in male Wistar rats compared with rats fed with a low iron diet ([18](#)). In line with our findings, a study revealed that consumption of dates may increase hemoglobin levels in adolescent girls with anemia ([19](#)).

Our results indicated that the combined use of ferrous fumarate and dates is considerably more effective in increasing hemoglobin levels during pregnancy than taking ferrous fumarate alone. Based on the results, date consumption caused a 1.1% rise in the mean hemoglobin level of women in the third-trimester of pregnancy. Consumption of right amounts of dates can be recommended as an alternative to iron supplements ([20, 21](#)).

Conclusion

Combined use of dates and ferrous fumarate is more effective than consuming only ferrous fumarate in increasing the hemoglobin level of women in third trimester of pregnancy. It is recommended to evaluate the effect of combined use of different types of dates and ferrous fumarate on hemoglobin levels of women in different pregnancy stages.

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Ethical statement

The study was approved by the Health Research Ethics Committee of Komisi Etik Penelitian Kesehatan Poltekkes Kemenkes Jambi (Reference number LB.02.06/2/31/2019).

Conflict of interest

The authors declare that there is no conflict of interest.

Author contributions

IK and AGW were responsible for the study conception and design; YS performed the data collection; IK and AGW performed the data analysis; IK, AGW, and YS were responsible for the drafting of the manuscript; IK and AGW made critical revisions to the paper for important intellectual content.

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