ORIGINAL ARTICLE

The Effect of Spinach Combined With Date Juice on Hemoglobin Concentration Among Pregnant Women in Indonesia: A Queasy Experimental Design

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ABSTRACT

Introduction: Anemia is one of the most common problems that can occur during pregnancy. Spinach leaves and date fruit contains a high carbohydrate and fat content, as well as 15 different salts and minerals, as well as proteins and vitamins. However, limited researchers are examining the effect of spinach and date juice on the hemoglobin levels of pregnant women. **Methods:** This study aimed to determine the effect of spinach and date juice on hemoglobin levels among pregnant women. This study was a queasy experimental design conducted in public health center, Cimahi, West Java, Indonesia on pregnant women who were admitted for normal vaginal delivery. **Results:** Every woman must consume spinach and date juice for seven days, from 7 to 10 a.m. ANCOVA test was performed to compare the pre- and post-intervention differences in hemoglobin concentration between the two study groups. The total hemoglobin concentration increased significantly from 10.16 (SD=2.12) to 12.45 (SD=3.57) after drinking spinach and date juice for 7 days, with t-value = 7.62 and p-value = 0.000. While, there was no statistically significant increase in the control group, with a p-value of 0.142. ANCOVA test revealed differences in life skill scores between the intervention and control groups following the motivational interviewing intervention, with F=93.56 and a p-value<0.001. **Conclusion:** Spinach and date juice may be useful to reduce anemia during pregnancy. Healthcare professionals could suggest pregnant women to consume spinach and date juice regularly to prevent anemia.

Keywords: Spinach leave, Date, Anemia, Pregnancy

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INTRODUCTION

Anemia is one of the most common problems that can occur during pregnancy. It is a known risk factor for adverse pregnancy consequences, including premature births (1), low birth weight (2), fetal disability, and maternal - perinatal fatalities (3). According to Stevens et al. (4) anemia affects non-pregnant women, pregnant women, and children in equal proportions. A hemoglobin level less than or equal to 110 g/L is considered anemic in pregnancy by the World Health Organization (5,6). Anemia is more common in developing countries (43%) than industrialized countries (9%) (7). People who live in different socioeconomic situations, have different lifestyles, or seek help for their health are more likely to have anemia during pregnancy than people from other cultures (8,9). In Indonesia, the frequency of anemia among pregnant women has increased from 37.1 percent in 2013 to 48.9 percent in 2018 (Ministry of Health, 2018).

During pregnancy, hemoglobin levels are reduced between the second and third trimesters of pregnancy, plasma volume expands by 25–80 percent (10,11). Anemia risk factors should be investigated as early in pregnancy as possible, according to previous research (12). Consequently, in this study, we used the hemoglobin level calculated before the 14th week of gestation in order to identify the factors related with anemia in pregnant women. The effects of anemia

on pregnancy were evaluated using the hemoglobin level in the third trimester, which reflects the physiological changes in plasma volume during this stage.

For decades, people have relied on folk medicines such as plants and natural materials. Numerous countries place a high premium on spinach (enough to cultivate it as a food crop (13). For centuries, spinach has been utilized as a medicinal herb to treat a range of human ailments. According to prior research, a methanol/water extract of spinach leaves has a comparable effect on cholecystokinin release to fluoxetine. On average, spinach contains 10–11 mg of iron per 100 g dry matter (14). The date palm fruit, Phoenix dactylifera, contains a high carbohydrate and fat content, as well as 15 different salts and minerals, as well as proteins and vitamins (15). Date fruit is also a good source of dietary fiber, with 14 varieties containing between 6.4 and 11.5 percent dietary fiber (15). A well-balanced diet that contains dates appears to be a prudent choice for pregnant women, given the existing knowledge on the general nutritional value and potential health benefits of dates, as well as the benefits of optimal nutrition for pregnant women. A healthy pregnancy may also benefit from date fruit's ability to prevent anemia, alleviate nausea, regulate blood pressure and sugar levels, replace calcium, eliminate toxins, and enhance strength and immune resilience (15). However, in Indonesia, limited researchers are examining the effect of spinach and date juice on the hemoglobin levels of pregnant women. Thus, this study aimed to determine the effect of spinach and date juice on hemoglobin levels among pregnant women.

MATERIALS AND METHODS

Study design

This study was a queasy experimental design conducted in public health center, Cimahi, West Java, Indonesia on pregnant women who were admitted for normal vaginal delivery. The study was conducted from August 2020 to December 2020An ethical permission has obtained from the ethical committee at STIKes Ahmad Yani Cimahi, Indonesia. Following research explanation and agreement, the women participating in the study were asked to join one of two open-label groups, with an instruction against cross movement.

Sample

The study included pregnant women in the second trimester with a gestational age of over 20 weeks and hemoglobin concentrations of 8 to 11%. Participants who were pregnant at a high risk, had a constricted pelvis, had pre-eclampsia, or had uterine atony were excluded. The study included 60 women, half of whom drank spinach and date juice, and the other half of whom did not (served as controls). The participants in the study were selected using the convenience sampling method.

Materials

Fresh spinach leaves, date fruits, and water were acquired from the Cimahi vegetable and fruit market. A disposable platter held about 50 spinach leaves and date fruits. The first group was given seven pieces of spinach and asked to juice it with 50 cc water. Every woman must consume spinach and date juice for seven days, from 7 to 10 a.m. The second group received neither spinach nor date fruits, and was thus deemed a control. Nurses prepared the spinach leaves and date fruits. When the women were enrolled in the study group, they were given seven pieces of fruit every time they vomited after eating the spinach and date fruits.

Measures

Specific parameters were measured: hemoglobin using blood sample. We classified anemia in pregnancy as Hb 110 g/L based on WHO guidelines. Mild, moderate, and severe anemia were classified as Hb levels ranging from 100 to 109 g/L, 70-79 g/L, and less than 70 g/L, respectively [3].

Data analysis

An organized questionnaire was used to gather data, which was then analyzed with the SPSS software, version 20.00. (SPSS Inc., Chicago, IL, USA). The demographic differences between the experimental and control groups were examined using independent sample t-tests and chi-square tests. Hemoglobin concentration were assessed before and after inetrevntion by using a paired t-test. Next, the ANCOVA test was performed to compare the pre- and post-intervention differences in hemoglobin concentration between the two study groups.

RESULTS

Table I shows that the mean age of the respondents was 25.03±3.10 for intervention group and 24.01±3.07 for control group. The majority of participants had education above senior high school, unemployed, and covered by national health insurance. The mean of gestational age was 21.15±1.65 for intervention group and 21.34±1.07 for control group. There was no significant difference between intervention and control groups in terms of age, education level, employment status, insurance status, and gestational age.

The total hemoglobin concentration increased significantly from 10.16 (SD=2.12) to 12.45 (SD=3.57) after drinking spinach and date juice for 7 days, with t-value = 7.62 and p-value = 0.000. While, there was no statistically significant increase in the control group,

Table I : Demographic characteristics of pregnant women (N=60)

Variable	Intervention (n=30)		Control (n=10)		*p* value
	n	%	n	%	
Maternal age (year) (Mean±SD)	25.03±3.10		24.01±3.07		0.127
Education level					
Below senior high school	13	43.3	15	50.0	0.851
Above senior high school	17	56.7	15	50.0	
Employment status					
Unemployed	20	66.7	18	60.0	0.278
Employed	10	33.3	12	40.0	
Insurance status					
National health insurance	23	76.7	20	66.7	0.856
Non-insurance	7	23.3	10	33.3	
Gestational age (week) (Mean±SD)	21.15±1.65		21.34±1.07		0.111

Table II : Differences in hemoglobin concentration before and after intervention (n=60)

	Pre-test (Mean ± SD)	Post-test (Mean ±. SD)	t	Mean difference	*p*- value
Hb Concentration					
Intervention	10.16±2.12	12.45 ± 3.57	7.62	1.79	0.001
Control	10.03±2.35	10.32 ± 2.35	10.30	1.34	0.142

Table III : The effect of spinach and date juice on hemoglobin concertation in pregnancy women (n=60)

Source	Type III Sum of Square	Df	Mean Square	F	*p*-value
Pre-test	43.124	1	43.12	0.37	0.571
Group	12689.57	1	1206.57	93.56	0.000

with a p-value of 0.142 (Table II). ANCOVA test revealed differences in life skill scores between the intervention and control groups following the motivational interviewing intervention, with F=93.56 and a p-value<0.001 (Table III).

DISCUSSION

This study found that spinach leave and date juice could increase hemoglobin concentration among pregnant women. Pregnant women may benefit from consuming spinach leaves and date juice, according to a new study. A study (16) of pregnant women in Kalimantan found that date juice dramatically boosted hemoglobin levels in the blood. While spinach and date juice have been shown to have an influence on hemoglobin levels, no study has ever paired the two together. Dates are rich in vitamin C, which aids in iron absorption by converting ferric iron to ferrous iron (ferrous iron is more easily absorbed by the intestines so that it can be used directly in forming hemoglobin for red blood cells or erythrocytes). Other than vitamin B complex, dates are rich in folic acid; carbs; zinc fat; and other nutrients that aid in the synthesis of hemoglobin. In order to produce new red blood cells and transport them to the bone marrow, iron in dates is required. This iron is utilized to make hemoglobin, which binds oxygen for metabolic usage and is absorbed into the circulation. Secondary metabolites and essential oils from medicinal plants are more important sources of therapeutic value. It is stated that medicinal plants can be used to treat a wide range of disorders because of their safety, affordability, effectiveness, and ease of access (17).

Spinach comes from south-eastern Asia and Ancient Persia, where it was first grown about 2000 years ago. To make blood, breathe, use energy and make collagen and some neurotransmitters, and keep your immune system healthy, you need a lot of iron. Iron is an important element because it is needed for these things and many more. Spinach has a lot of iron in it, so it can help people with low hemoglobin levels. It has 3.9 mg of iron per 100 grams. Because iron is needed to make red blood cells, Susianto says hemoglobin can't be made without it. Iron is the central atom of hemoglobin, so it is important for red blood cells to be made. Besides having 80 mg of protein and vitamin C per 100 grams, spinach also has iron. This iron can be oxidized to ferrous, which is easier for the body to take in and use (18). Wijayanti said that the ferrous form of iron is better for taking iron because it dissolves quickly. There must be an acidic state in the stomach, as well as compounds that change Ferri to Ferro, like ascorbic acid, which is found in spinach. In order to get iron from spinach, you first have to break it down. Then the ferric acid dissolves in your intestines and is bound by gastroferin so that it turns into Ferro. This makes the iron in spinach Ferro (the active form of iron). After the ferrous form of iron is carried to the small intestine (duodenum), the process of iron absorption starts. This is made easier by a protein called transferrin. Then transferrin moves ferro around the body, especially to bone marrow, where it can mix with hemoglobin to make blood (Adriyani, 2012).

Despite the fact that this study has limitations, such as a small sample size and a high number of potentially confounding variables, such as food recalls, it can be utilized as a pilot study for larger, more rigorous investigations in the future, as well as for clinical trials with longer follow-up periods. Adding spinach and date juice to the present iron-folic acid supplement may also alleviate nutritional anemia during pregnancy, according to a prospective study.

CONCLUSION

In conclusion, we note that spinach and date juice may be useful to reduce anemia during pregnancy. Healthcare professionals could suggest pregnant women to consume spinach and date juice regularly to prevent anemia. Further trials with the specification of the appropriate number of pieces or amount of spinach leave and date fruits to be consumed and duration of date fruit consumption are needed.

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