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by

Submission date: 23-Apr-2022 11:07AM (UTC+0700)
Submission ID: 1817899431
File name: 95._Agussalim_Bukhari-Hamzah.pdf (604.8K)
Word count: 4859
Character count: 25808

Sapporo Medical Journal
Volume 56, Issue 02, February, 2022

Effects of Ajwa Dates (*Phoenix Dactylifera L.*) Consumption on Haemoglobin Levels and Nutritional Status

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Abstract— **Background:** Based on a 2013 *World Health Organization* (WHO) report, the world maternal mortality rate is 289,000. Nutrition status during pregnancy has a significant impact on the health of both mother and baby.Ajwa dates cover vitamins such as riboflavin, biotin, thiamine, folic acid, and ascorbic acid that are important for the body.This fruit can increase haemoglobin levels because it is rich in iron.This study aims to see the effectiveness ofAjwa dates on haemoglobinand nutritional status in pregnant women.
Method: Pre-experimental is a research design with the method of two group pre-test and post-test, using two groups before and after being given interventions to find out the effect of Ajwa date consumption on haemoglobin and status nutrition levels in pregnant women.
Result: Differences in haemoglobin levels of antepartum and postpartum groups intervention and control have a value of P-Value (0.000). Ajwa dates can increase haemoglobin levels in pregnant women by a difference of antepartum 1.67 g/d and postpartum 1.58 g/dl. The results of the intervention group's Protein Adequacy Level test and the control group after treatment had a P-Value (0,001), so that it can be concluded that there is a significant difference between the Protein Adequacy Level of the intervention group and the control group after treatment with a difference of 5.68%RDA.
Conclusion: Ajwa Dates can increase haemoglobin levels and nutritional status of pregnant women during pregnancy.

Keywords—Haemoglobin, Nutritional Status, Pregnant Women.

1. Introduction

Every year about 160 million women worldwide experience pregnancy, some of which run smoothly. However, 15% of these pregnancies will be found to be life-threatening complications for both mother and baby. Based on a 2013 *World Health Organization* (WHO) report, the world maternal mortality rate is 289,000. Southeast Asia is ranked third out of maternal deaths after Sub-Saharan Africa and South Asia. Based on Indonesian demographic and health survey in 2012, maternal mortality rate in Indonesia per 100,000 live births is 359 occurrences. Maternal mortality rate in Indonesia is still dominated by the three leading causes of death, namely bleeding, hypertension in pregnancy, and infection.[1–5]

Lack of haemoglobin (Hb) levels of pregnant women is one of the health problems prone to occur during pregnancy. Hb levels less than 11 g/dl indicate pregnant women suffer from anaemia. Anaemia in pregnant women increases the risk of getting a Low Birth Weight Baby; the risk of bleeding before and during labour can even cause the death of the mother and her baby if the pregnant woman suffers from severe anaemia. It can undoubtedly contribute significantly to the mortality rate of maternity mothers and infant mortality, which based on Indonesian demographic and health surveyin 2017 the figure is still relatively high, namely the maternal mortality rate 228 per 100,000 live births and the infant mortality rate 34 per 1,000 live births.[11]

Status nutrition is a condition caused by the balance between nutrients from food and nutrients needed for the body's metabolism. Nutritional status during pregnancy has a significant impact on the health of both mother and baby. Nutritionaldiss wholeness increases during pregnancy to maintain the mother's metabolism and support fetal growth and development. The most common nutritional problem in pregnant women is Chronic Energy Deficiency (CED). The prevalence of CED women in developing countries is 15-47%.[6–8]

The date fruit (*Phoenix dactylifera L.*) Ajwa variety is a famous date specified in Medina. The fruit tends to be round rather than elliptical like date fruit in general, coloured mustard ripe to black when ripe. This fruit can increase haemoglobin levels because it is rich in iron. Ajwa dates cover vitamins such as riboflavin, biotin, thiamine, folic acid, and ascorbic acid that are important for the body. The fruit pulp is rich in calcium, iron, copper, cobalt, magnesium, fluorine, manganese, phosphorus, and potassium. Ajwa dates contain phytochemical compounds such as coumaric acid, ferulic, flavonoids, procyanidins, vitamins, and minerals that can act as anti-oxidants and anti-hyperlipidemic hepatoprotective, anti-mutagen, anti-inflammatory, and nephroprotective.[13]

Based on these things, researchers want to test the effect of Ajwa date consumption on the levels of haemoglobinand nutritional status of third trimester pregnant women.

2. Methods

Pre-experimental is a research design with the method of two group pre-test and post-test, using two groups before and after being given interventions to find out the effect of aAwa date consumption on haemoglobin and status nutrition levels in pregnant women. Which consisted of 28 intervention groups who were given Ajwa dates and 28 control groups.The place of management of this research is Mother and Child Hospital SittiKhadijah 1 Muhammadiyah Makassar of Indonesia.The implementation of this research was carried out from February to December 2021. The population used in this study were pregnant women with a gestational age of 28-30 weeks who checked themselves at Mother and Child Hospital SittiKhadijah 1 Muhammadiyah Makassarfollowed until delivery at term.

3. Results

The research group consisted of intervention groups who were given Ajwadates from 28-30 weeks of gestation until delivery at term, about 10-12 weeks.And control groups were not given Ajwa dates but were monitored from 28-30 weeks of gestation until delivery at term.

Table 1. Differences Test in Haemoglobin Levels of Pregnant Women Intervention and Control Group

	Intervention Average ± SD	Control Average ± SD	Difference	P-Value
Pre-Treatment	9.52 ± 1.46	9.63 ± 1.51	0,11	0,806*
Antepartum	11.95 ± 1.12	10.28 ± 1.34	1,67	0,000*
Postpartum	11.21 ± 1.33	9.64 ± 1.27	1,58	0,000*

*real difference at a significant rate of 5%

In this study we found that differences in haemoglobin levels of pregnant women in the control group and intervention during pre-treatment on the Mann Whitney test have a value of P-Value (0.806) > a significant level (0.05), so it can be concluded there is no significant difference between the haemoglobin levels of the intervention and control group. It showed that haemoglobin levels data in two groups of pregnant women before treatment were the same.Differences in haemoglobin levels of antepartum groups intervention and control on the test t data unpaired have a value of P-Value (0.000) < significant level (0.05), so it can be concluded there is a significant difference between the haemoglobin levels of pregnant women intervention group and control when antepartum. It shows that Ajwa dates can increase haemoglobin levels in pregnant women by a difference of 1.67 g/dl.Differences in haemoglobin levels of postpartum pregnant women intervention and control groups in the unpaired data t-test have a significant P-Value (0.000)< (0.05), so it can be concluded that there is a significant difference between the haemoglobin levels of the intervention group and control during postpartum. It shows that Ajwa dates can suppress postpartum hemorrhage, which can be seen in the hemoglobin level of postpartum mothers with a difference of 1.58 g/dl.

Table 2. Weight Difference Test, Upper Arm Circumference, Protein Energy Adequacy Levels of Pregnant Women Intervention Group and Control Group After Treatment

Variable	Group	Average SD ±	Difference	P-Value
WeightAfter treatment	Intervention Control	70.56±6.58 67.90±10.04	2,66	0,043
Upper arm circumferenceAfter treatment	Intervention Control	28.78±2.50 27.35±2.24	1,43	0,007
Energy adequacy levelAfter treatment	Intervention Control	105.93±0.15 92.18±0.18	13,75	0,004
Protein adequacy levelsAfter treatment	Intervention Control	98.32±0.16 92.64±0.11	5,68	0,001

Based on the table 2, it can be known that the difference in the weight of pregnant women intervention group and control group after treatment on the Independent T-test-test has a P-Value value (0.043) < significant level (0.05), so it can be concluded there is a significant difference between weight, pregnant women intervention group and control group after treatment with a difference of 2.66 kg. The results of the difference in the Upper Arm Circumference of pregnant women of the intervention group and the control group after treatment on the T-test Independent had a P-Value (0.007) < significant level (0.05), so that it can be concluded that there is a significant difference between the Upper Arm Circumference of the intervention group pregnant women and the control group after treatment with a difference of 1.43 cm. The results of the energy adequacy levelof pregnant women intervention group and control group after treatment on the Mann-Whitney test had a P-Value (0.004) < significant level (0.05), so it can be concluded that there is a significant difference between the Level of Adequacy of Energy pregnant women intervention group and control group after treatment with a difference of 13.75%recommended dietary allowance (RDA). The

results of the intervention group's Protein Adequacy Level test and the control group after treatment on the Independent T-test-test had a P-Value (0,001)< significant level (0.05) so that it can be concluded that there is a significant difference between the Protein Adequacy Level of the intervention group and the control group after treatment with a difference of 5.68%RDA. It shows that the consumption of Ajwa Dates fruit can improve pregnant women's nutritional status during pregnancy.

4.Discussion

Nutritional anaemia is a significant public health problem in children and women in developing countries. Despite an ongoing national program to equip pregnant women with iron-folate, the prevalence of anaemia is 39% among pregnant women and 78% among babies in Bangladesh. Vitamin B12 deficiency is a more common cause of megaloblastic anaemia than folate in many developing countries. Low dietary intake of animal products, the primary vitamin B12, can lead to anaemia. In addition to maintaining normal erythropoiesis, B12 is essential for immune function. [40]

This study shows the magnitude of the influence of Ajwa date fruit in improving the nutritional status of pregnant women in the third trimester. Ajwa dates are nutrient-rich food ingredients because many contain energy from carbohydrates (glucose, fructose), protein and fat and are complete with vitamin and mineral content. Ajwa date fruit contains a total sugar of 74.3 grams, lipids of 0.47 gr and protein 2.97 gr. If Ajwa dates are converted, about 313 calories per 100 grams of Ajwa dates are obtained. So one Ajwa date contains 31.3 calories. Because of the content owned by Ajwa, date fruit can help improve the nutritional status of pregnant women, mainly in terms of Protein Energy Adequacy Level. It is evident from the analysis using the Paired T-Test test that the intervention and control group showed a p-value of 0.000. It means that there is a significant change in the adequacy rate of Energy Protein between before and after consuming Ajwa date fruit. The protein adequacy of pregnant women in the intervention group increased more than in the control group. It is supported by research conducted by the Laboratory of the Department of Public Nutrition, FEMA IPB, with preference tests conducted on 30 samples. The results showed that date fruit contains more carbohydrates than biscuits, crackers, doughnuts, and others. Therefore, Ajwa dates as an alternative energy provider with high carbohydrate content. To improve the degree of a person's Energy Adequacy Level.[5, 41]

Similarly, the parameters of change in weight and upper arm circumference, which showed in the intervention and control group, showed a p-value of0.000. It means a significant change in weight and upper arm circumference between before and after consuming the Ajwa date fruit. Weight gain and upper arm circumference were more significant in the intervention group than in the control group. This research is supported from previous research conducted by MuftihatulHidayah in 2018, bivariate analysts using the T-test*(*Paired Sample Test*)*it is known that the intervention group and control group before and after being given the treatment has a value of p = *0.000* then it can be said that there are significant nutritional changes before and after controlled. Considerable changes occurred in the intervention group due to consuming Ajwa dates as much as seven pieces per day. ThusAjwa dates can improve the nutritional status of pregnant women. Ajwa dates are rich in nutrients high in carbohydrates, low in protein, and fat are thought to play an active role in nutritional and weight improvement.[42]

From the research's result of Yulianti in 2021, bivariate analysis using the T-test (Independent Sample test) found that the average haemoglobin level in the case group before being given Ajwa dates was 10.32 gr/dL and after giving Ajwa dates were 10.79 gr/dL. Bivariate analysis showed an effect of Ajwa dates on the increase in haemoglobin levels in pregnant women TM III (p-value 0.003<0.05). [43]

Sapporo Medical Journal
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In this study we found that haemoglobin levels of antepartum groups intervention and control on the test t data unpaired have a value of P-Value (0.000) < significant level (0.05), so it can be concluded there is a significant difference between the haemoglobin levels of pregnant women intervention group and control when antepartum. It shows that Ajwa dates can increase haemoglobin levels in pregnant women by a difference of 1.67 g/dl.Differences in haemoglobin levels of postpartum pregnant women intervention and control groups in the unpaired data t-test have a significant P-Value (0.000)< (0.05), so it can be concluded that there is a significant difference between the haemoglobin levels of the intervention group and control during postpartum. It shows that Ajwa dates can suppress postpartum hemorrhage, which can be seen in the hemoglobin level of postpartum mothers with a difference of 1.58 g/dl.

Fauziah in 2020, there is an effect of giving dates in pregnant women to increase haemoglobin levels with an average increase in haemoglobin levels by 2.5%, with a significant value of 0.001. Showed the effect of increased haemoglobin levels with the administration of dates, using the Paired t-test and Independent t-test. There was an increase in haemoglobin levels in the blood after the intervention of Ajwa dates for 14 days, an increase in iron levels of about 2.5gr/dL. [44]

This research is also supported from previous research by Retnoin 2019, with the statistical test used is the Wilcoxon test with a confidence level of 95%. The results showed an average haemoglobin level before administering Ajwa dates of 9.6 gr/dL, while after giving Ajwa dates for ten days, the averagewas10.6 gr/dL. There is a significant influence (p-value 0.004 < 0.05) giving Ajwa dates with haemoglobin levels of pregnant women with anaemia. Thus the results of laboratory tests are known iron levels in Ajwa dates are high. The research concludes that Ajwa dates can increase haemoglobin levels in pregnant women and can be used as a supplement to increase haemoglobin levels.[45]Based on research conducted by Syahidatul in 2018, an experiment on distended mice obtained the result that there is an increase in haemoglobin levels in mice given Ajwa dates.[13]

In addition, in the view of Islam, the advice to eat Ajwa dates is contained in the hadith. Hadith narrated by Imam Ahmad: that the Prophet once said:
"He told us, Harami bin Umarah that he said; He had told me Murajja bin Raja' from Ubaid ibn Abu Bakr ibn Anas from Anas bin Malik he said; "On the day of id al-Fitri the Prophet did not come out until he ate some dates first and bought to eat with odd numbers" (H.H: Ahmad No.11820). [14]

The hadith above recommends eating dates in odd quantities, such as three, five, seven, nine, and so on (more than two). Therefore, research tried to use a variation of 3 dates (equivalent to a dose of 3.12 mg/kg), 5 grains of dates (equivalent to a dose of 5.2 mg/kg) and seven dates (equivalent to a dose of 7.28 mg/kg). The use of this dose refers to the iron needs needed by the mother during her pregnancy following the trimester of pregnancy. Ajwa dates have been shown to maintain the highest antioxidant activity among other types of dates, suppress lipid peroxidation, prevent cell damage, improve cancer therapy and reduce side effects caused by conventional chemotherapy. It has been shown that *Phoenix dactylifera* contains a much higher total phenol content than alcohol extracts, especially in Ajwa dates. [15]

Then it is also explained in Surah Maryam *"And shake the trunk of the date tree towards you; it will abort the ripe date fruit to you, so eat, drink and have your heart. If you see a human being, say, "I have vowed to fast for the Most Merciful Lord, and I will not speak to any human being today."* (Q. Maryam 25-26). [47]

The translation of the above verse explains that dates are a suitable fruit for consumption by Maryam. At

that time. Allah guides humans, especially pregnant and postpartum women, to consume date fruit full of nutrients following nutritional intake for pregnant women. However, not only for pregnant and postpartum women, but date fruit is suitable for all ages, both children, adults, and the elderly. Verse 25 indicates that dates are an excellent food for women in the postpartum period because they are easy to digest, delicious, and contain high calories.[48]

In the above verse is guidance or guidance from Allah SWT. The food (rizq) for Maryam at that time was a date; it is complete or rich in nutrients. Moreover, dates are the right food for Maryam because it is full of benefits and nutrients that are needed. Maryam was ordered to consume date food and was also ordered to drink because dates are food (in the form of solid objects), and drinks (which are drunk are liquid substances in it include sugar substances contained in it and others). And in this verse also Maryam as. It is instructed to remain calm and not worry about the position and circumstances at that time because Allah will certainly help him and pay attention to him and because He is the Almighty And All-Knowing God.[48]

Saturated and unsaturated fatty acids, such as the folate acid in date fruit, play an essential role in prostaglandin production and contribute and provide energy. [48] The last increase in levels in pregnant women causes uterine contractions during the term. [49] Therefore, the consumption of dates cannot help save energy and strengthen the uterine muscles. This fruit also contains hormones that help stretch the uterus and prepare for the birth of a baby.[50] Its consumption is beneficial in storing energy and strengthening uterine muscles. [51] Thus, this fruit prevents postnatal bleeding spontaneous labour and accelerates the progress of labour. According to Kordi*et al.* and Yusefy*et al.*, consuming date fruit at the end of pregnancy is vital in spontaneous labour. [52, 53]Maisen*et al.* said that the duration of the latent phase when delivery was shorter in the group that consumed dates, and the average cervical opening at the time of hospital admission was significantly higher than in the group that consumed date fruit. [49] Dates affect oxytocin receptors and make the uterine muscles respond better to oxytocin, resulting in more effective uterine contractions. [51]

Drinking water after consumption of dates during labour may be more effective in increasing labour than intravenous fluid administration alone. A recent study conducted at KSA investigated the effects of eating date fruit and drinking water versus intravenous fluids during labour on labour and neonatal outcomes; there was a significantly shorter average duration of the second and third stages of labour in the study group than the control group. Consumption of date fruit at the end of pregnancy has good results in shortening the stage of labour without affecting labour results. In a Jordanian study, the effect of date fruit consumption at the end of pregnancy in labour and birth was determined starting from the final weeks of pregnancy; a comparison between the two groups showed significant results in cervical dilation upon entry, amniotic membrane status, an early type of labour, and less need for prostin/oxytocin use. The study concluded that consumption of dates in the last four weeks before delivery significantly reduced the need for induction and augmentation of labour and provided better, but not significant, delivery outcomes. [51]

In a U.S. cash control study conducted in Jordan, where 69 pregnant women consumed six pieces of dates daily for four weeks compared to controls that did not consume date fruit, dates had antioxidant anti-inflammatory and calcium-rich properties, which can contribute to the contraction of the smooth muscle of the uterus. In addition, they are known to contain 15 types of salt and minerals, in addition to a high percentage of vitamins, carbohydrates, and fats. It is hypothesised that date fruit stimulates the uterine muscles to respond better to oxytocin, thus preparing the uterus and cervix for childbirth. [50]

4. Conculsion

There was a significant difference in haemoglobin levels in antepartum and postpartum pregnant women after consuming Ajwa dates compared to those who did not consume aAwa dates. It suggests that consumption of Ajwa dates can increase haemoglobin levels in antepartum and postpartum pregnant women.Ajwa dates can improve the nutritional status of pregnant women in the third trimester during pregnancy.

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