

# Effect of Consumption Dates Fruit At-term Pregnancy to Hormone Oxytocin and Labor Outcome in Pringsewu Regency, Lampung Province, Indonesia

Apri Sulistianingsih\*, Istikomah, Wahyu Widayati, Indah Cahyaning Sasih,  
Rissa Uhumul Khasanah, Anisa Lestari

Department of Midwifery, Faculty of Health, Muhammadiyah University of Pringsewu, Indonesia

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**Abstract** Indonesia's most common labor complications are restlessness or severe pain at 53.5%, prolonged labor at 40.6%, and not strong enough to push 10.3%. In Islamic studies, dates fruit has been used for childbirth. The effects of consuming dates fruit on pregnancy outcomes are not fully understood as to the mechanisms and hormones that play a role in them. This study examines the effect of consumption of dates fruit at term pregnancy on hormone oxytocin and labor outcome in Independent Midwifery Practice, Pringsewu District, Lampung Province, Indonesia. A quasi-experiment was used in the study. 60 normal-term pregnant women (37-38 weeks) were divided into treatment and control groups. 70-75 g of dates consumed daily for 14 days. Measurement of oxytocin levels uses ELISA. Measures of birth outcomes are monitored from the time the pregnant woman enters the delivery room until the completion of standard delivery care. T-test and Chi-square test analyses were employed in this investigation. Manova test-based multivariate analysis is used. The results revealed that consuming dates fruit affects labor oxytocin levels, colostrum excretion, duration of contractions, labor pain, and duration of first, second, and third stages of labor compared with the control group. (p-value <0.05). Meanwhile, anxiety, intact membrane, number of contractions, APGAR score in the first minute, and complete placenta did not show significant differences

(p-value > 0.05). Dates fruit can be an alternative to a Mother's pregnant term to increase labor outcome.

**Keywords** Dates Fruit, Labor Outcomes, Pregnancy, Oxytocin Level

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## 1. Introduction

Indonesia's most common delivery complications are nervous or great pain at 53.5%, prolonged labor at 40.6%, and no strong push at 10.3% [1]. Various factors can influence pain labor, like experience, fear, anxiety, stress, cultural, social, environmental factors, demographics, and religion [2, 3]. This can contribute to increased pain through the secretion of catecholamines, cortisol, and epinephrine, pushing the system's immunity to the body. The impact of this stress causes no complications such as the duration of the ripening process of the cervix, prolonged labor, risk of the fetus, low APGAR score, C-section, and increased hospital stay [4].

Various pharmacological and non-pharmacological approaches have been used to control and reduce pain and reduce labor and anxiety duration [5]. One of them is to approach nutrition so that the mother is strong enough to

make contractions effective and the head is faster [6]. *Phoenix dactylifera* Linn (fruit dates) is considered therapeutic in various Islamic cultures [7]. Dates are packed with phytochemicals like carotenoids, polyphenols, tannins, and sterols, as well as high levels of carbohydrates, B vitamins, calcium, magnesium, and potassium. Dates are a popular fruit in many parts of Asia and Africa, and they are generally considered healthy to eat while pregnant [8, 9].

Dates induce the semi-oxytocin hormone to cause uterine contractions and dilation more effectively during labor. This results in decreased blood loss and a need for more oxytocin and prostaglandins for inducing and enhancing labor efficacy. Dates contain various nutrients and chemicals, such as iron, calcium, serotonin, linoleic acid, tannins, and enzymes. Prochidas [10].

Several clinical investigations have been conducted to determine the impact of fruit dates on the outcome of various pregnancies, including painful deliveries, [12, 13] duration childbirth [12, 14], postpartum [10] need induction childbirth, [12] augmentation and onset of labor spontaneous depletion cervix, consistency, and position moment enter [13]. In a trial, the intake of fruit dates (70g/day, in stage Ruthab) from 37 weeks of pregnancy until the beginning of labor causes a significant decrease in the duration of childbirth, increases the dilation of the cervix, and there is a significant influence on the rate of bleeding during labor [15]. However, clinical trials intake of daily fruit dates (80g/day, in the Tamer stage) at the same time did not affect dilation cervix moment entry, duration of phase latency, duration of stages 1, 2, 3 of labor, and maternal hemoglobin (Hb) status [13].

The effect of consumption of date fruit at the end of pregnancy seems still unclear. This is because the effect of consuming fruit dates on yield pregnancy is not yet fully understood; mechanisms and hormones are involved inside it as well, as there is no consensus about the amount of fruit consumption necessary dates taken for making external appropriate pregnancy, labor, and delivery. Still, limited studies about the effect of fruit dates on mother pregnant women explain hormone mechanisms inside. The studies preliminaries conducted in Independent Practice Midwives (IMP) in the District Pringsewu show that midwives can do non-pharmacological therapy with recommendations for good food moment labor like fruit dates and date juice. Too many fruit dates are supplied in the district Pringsewu without waiting the month of Ramadhan [16]. This study aimed to know the effect of the consumption of fruit dates at the end of pregnancy on oxytocin levels and labor outcome in.

## 2. Materials and Methods

### 2.1. Study Population

This study used quasi-experiments—Post-test with a

control group in Midwifery Independent Practice Pringsewu. Researchers used four places. The researchers shuffled places randomly to determine the control and intervention groups. Each group uses two practice sites. The selected subjects are nulliparous women aged 20–35 with age 37–38 weeks of gestation (according to First day last period), single pregnancy, having presentation head, being planned pregnancy, no pathological diagnosis or complications during pregnancy, and not having a c-section plan. Research dropout criteria are women who don't consume dates for 14 days. Sample size set using a different test, two means with 95% confidence intervals were obtained for each group of at least 30 people so that a total of 60 participants were in the study.

### 2.2. Instrument

Demographic data are collected using age, gestational age, income, employment, and training questionnaires. Anxiety measurement uses the Hamilton Anxiety Rating Scale (HARS), divided into mild, moderate, and severe anxiety [17]. Oxytocin levels are measured when the mother enters labor in the first active phase by withdrawing three ml of venous blood. The blood is then converted into serum using a centrifuge tube and analyzed in the Study Program Laboratory Technology Laboratory Medical Polytechnic Health Care Tanjung Karang Lampung using Elisa. Cervical dilatation on arrival, intact membrane, amount of contractions, duration of contractions use observation with checklist sheet, colostrum production, and pain scale measured by Numeric Rating Scale (NRS) [18]—an instrument for duration labor used sheet observation with score minutes. The researcher performed a newborn fitness examination using the APGAR score examination conducted in the birth's first and fifth minutes [19]. Administration of second oxytocin and placental completeness evaluation are based on observation and standard delivery care procedures [20].

### 2.3. Intervention

The intervention group got 14 packs of dates (70–75 g) consumed for 14 days starting from 37–38 weeks of pregnancy. Dates given to research are dates Ajwa with maturity Tamr [21], because the content is 77% sugar (3.2% sucrose, 51.3% glucose, and 48.5% fructose) and a high proportion of minerals (3%) compared to varieties of other dates (1.5–2.7%), mainly calcium (1.22 g/100 g of material dry) [22]. Monitor obedience through group WhatsApp and a checklist sheet that remind the subject of routine to eat it. The control group gave standard regular care to term pregnant women with the 2020 version of the Maternal and Child Health book guidelines [23, 24]. Delivery care uses routine delivery care with sixty steps of delivery care based on Indonesian Standard [20]. Pregnant women are taught routine care before labor and to detect signs of delivery and asked to come to the midwife if they

have labor and labor pain symptoms.

Both groups were monitored until 40 weeks of age by teaching pregnant women how to detect fetal movements. At the time of the delivery sign, it was clear that both groups were given standard normal delivery care and monitoring using a partograph when they entered the delivery room. Both groups were measured for oxytocin levels when they entered the first stage of the active phase and were further managed until after birth outcomes were obtained.

#### 2.4. Ethical Consideration

This study respects the rights of the research subjects, explains the advantages, and, as little as possible, prevents the disadvantages of the research subjects. Each prospective research subject is given the same opportunity to participate in research. The research subject's identity is confidential and free to withdraw at any time during the research process. This study pointed out rights ethics subject later research declared with submit agreement ethics to Committee Ethics Health Pringsewu Muhammadiyah University with number: 012/KEPK/FKES /2023.

#### 2.5. Data Analysis

Research data was obtained through blinded

enumerators in each group. The research data was then checked for completeness. Complete data is then continued to be input, while incomplete data is asked to be cross-checked again to meet each variable's criteria. To ensure that the data input was correct, two researchers carried out the computerized information while two other researchers read back the correctness of the data. The IBM Statistical Package for the Social Sciences V.24 was used to carry out the analysis. The presentation of descriptive data on categorical data uses a frequency distribution, while numerical data uses mean, standard deviation, median, and range values. The normality test is used for continuous data using the Smirnov – Kolmogorov test. Numerical data are normal distributions. The analysis used is the Chi-square test for categorical data variables, while the independent T-test is used for numerical data. Analysis is multivariate using the Manova test.

### 3. Results

Based on Table 1, the characteristics of the research subjects showed no significant differences in age, education, income, occupation, and training in the two groups. ( $p$ -value  $> 0.05$ ). This means that each group is equal and comparable

**Table 1.** Characteristics subject study

Variable	Group		
	Control	Intervention	P-value
<b>Age (years)</b>			
Means (SD)	26.49 (3.69)	27.70 (4.04)	0.868
Median	26.50	28.50	
Range	21-34	21-34	
<b>Education</b>			
Junior High School	8 (26.7%)	3 (10.0%)	0.165
Senior High School	11 (36.7%)	10 (33.3%)	
University	11 (36.7%)	17 (56.7%)	
<b>Income</b>			
< regional standard	15 (50%)	14 (46.7%)	1.000
≥ regional standard	15 (50%)	16 (53.3%)	
<b>Job</b>			
Employe	14 (46.7%)	16 (53.3%)	0.796
Houswife	16 (53.3%)	14 (46.7%)	
<b>Exercise</b>			
Less active	15 (50.0%)	13 (43.3%)	0.605
Active	15 (50.0%)	17 (56.7%)	

\*Significantly different at  $p < 0.05$ .

**Table 2.** Differences between the two groups upon entering the delivery room

Variable	Group		P-value
	Control	Intervention	
<b>Oxytocin level ( pg /ml)</b>			
Means	67.36	81.02	<0.001
(SD)	(13.21)	(18.34)	
Median	66.1	81.85	
range	48-99	54.4-114.8	
<b>Anxiety</b>			
Light	3 (10.0%)	9 (30.0%)	0.132
Medium	12 (40.0%)	11 (36.7%)	
Heavy	15 (50.0%)	10 (30.0%)	
<b>Membrane intact</b>			
No	6 (20.0%)	2 (6.7%)	0.129
Yes	24 (80.0%)	28 (93.3%)	
<b>Colostrum production</b>			
No	7 (23.3%)	1 (3.3%)	0.023
Yes	23 (76.7%)	29 (96.7%)	

\*Significantly different at  $p < 0.05$ .

In Table 2, it is explained that the oxytocin levels in the control group were significantly lower when compared to the intervention group (67.36 (13.21); 81.02 (18.34); p-value 0.000). Expenditure of colostrum in the control group was less than in the intervention group (76.7%; 96.7%; p value = 0.023). In anxiety, there was no significant difference in the intra-membrane when going to the delivery room in the two groups (p-value > 0.05).

Table 3 shows the progress of labor and delivery outcomes. Opening of labor at arrival in the control group was smaller than in the intervention group, but there was no significant difference (3.61 (0.67); 4.01 (0.56); p-value = 0.087). There was no difference in the number of labor contractions at arrival, the first and second hours (p-value > 0.05). There was no significant difference in the duration of contractions when they arrived (p-value > 0.05). The first and second hours showed that the control group's contractions were significantly lower than the intervention group (p-value 0.000). Labor pain showed that the control

group was higher since entering the delivery room, in the first hour and second hour (3.50 (0.82); 3.13 (0.43), 5.87 (0.68); 4.83 (0.79), 7.10 (0.92); 5.97 (0.76) ), P-value <0.05). The duration of labor in the first stage showed that the control group was significantly higher than the intervention group (312.97 (65.32); 212.67 (53.55), p-value = 0.000). The duration of labor in the second stage showed that the control group was significantly higher than the intervention group (80.40 (16.86); 49.13 (20.10), p-value = 0.000). The duration of labor in the third stage showed that the control group was significantly higher than the intervention group (13.00 (3.50); 10.80 (1.88)), p-value = 0.000). There was no difference in APGAR scores at the first and fifth minutes in infants in both groups (P value 0.253; P value 0.332). There was no difference in using the second oxytocin and the completeness of the placenta in the two groups (P value 0.353).

**Table 3.** Differences in labor progress and Labor Outcome on two group

Variable	Group		P-value
	Control	Intervention	
Opening on arrival (cm)			
Means (SD)	3.61 (0.67)	4.01 (0.56)	0.087
Median	3	4	
range	3-5	3-7	
Number of contractions on arrival (times/minute)			
Means (SD)	2.40 (0.62)	2.57 (0.56)	0.283
Median	2.0	3.0	
range	1-3	2-4	
The number of contractions in the first hour (times/minute)			
Means (SD)	3.60 (0.62)	3.70 (0.53)	0.507
Median	4.0	4.0	
range	3-5	3-5	
Number of second hour contractions (times/minute)			
Means (SD)	4.57 (0.50)	4.60 (0.49)	0.203
Median	5.0	5.0	
range	4-5	4-5	
Duration of contraction on arrival ( seconds )			
Means (SD)	20.20 (2.00)	20.33 (1.42)	0.768
Median	20.0	20.0	
range	17-25	18-25	
Duration of contractions in the first hour ( seconds )			
Means (SD)	28.97 (5.01)	37.50 (4.77)	<0.001
Median	29.0	38.0	
range	21-39	30-46	
Duration of contractions in the second hour ( seconds )			
Means (SD)	37.73 (4.17)	50.37 (5.69)	<0.001
Median	38.50	51.0	
range	30 - 45	34-60	
Labor pain on arrival			
Means (SD)	3.50 (0.82)	3.13 (0.43)	0.036
Median	3.0	3.0	
range	2-5	2-4	
Labor pain the first hour			
Means (SD)	5.87 (0.68)	4.83 (0.79)	<0.001
Median	6.0	5.0	
range	5-7	3-6	

Table 3 continued

Labor pain the second hour			
Means (SD)	7.10 (0.92)	5.97 (0.76)	<0.001
Median	7.0	6.0	
range	6-9	5-7	
Duration of first stage (minutes)			
Means (SD)	312.97 (65.32)	212.67 (53.55)	<0.001
Median	308.50	200.0	
Range	190-419	130 – 360	
Duration of second stage (minutes)			<0.001
Means (SD)	80.40 (16.86)	49.13 (20.10)	
Median	81.0	46.0	
Range	51-110	20-90	
Duration of third stage (minutes)			
Means (SD)	13.00 (3.50)	10.80 (1.88)	0.004
Median	13.0	11.0	
Range	8-21	8-18	
APGAR First minute			
Means (SD)	7.77 (0.93)	8.03 (0.85)	0.253
Median	8.0	8.0	
Range	6-9	6-9	
APGAR Fifth minutes			
Means (SD)	9.60 (0.67)	9.70 (0.89)	0.332
Median	10.0	10.0	
range	8 - 10	8-10	
Second oxytocin administrated			
No	26 (86.7%)	29 (96.7%)	0.353
Yes	4 (13.3%)	1 (3.3%)	
Complete Placenta detachment			
No	4 (13.3%)	1 (3.3%)	0.353
Yes	26 (86.7%)	29 (96.7%)	

\*Significantly different at  $p < 0.05$ .

**Table 4.** The effect of giving dates at the end of pregnancy on Labor outcomes

Dependent Variable	F	P value	R Squared	Adjusted R Squared
Anxiety	3.393	0.071	0.055	0.039
Duration of first stage	42.295	0.000	0.422	0.412
Duration of second stage	42.601	0.000	0.423	0.414
Duration of third stage	9.178	0.004	0.137	0.122
Labor pain on arrival	4.685	0.035	0.075	0.059
Labor pain the first hour	29.367	0.000	0.336	0.325
Labor pain the second hour	26.819	0.000	0.316	0.304
Duration of contraction on arrival	.088	0.768	0.002	0.016
Duration of contractions in the first hour	45.561	0.000	0.440	0.430
Duration of contractions in the second hour	81.378	0.000	0.584	0.577
Oxytocin level	10.944	0.002	0.159	0.144

\*Significantly different at  $p < 0.05$ .

Table 4 shows that dates contribute significantly to the duration of the first stage of labor, second stage, third stage, pain labor, duration of contractions in the first and second hours, and the rate of oxytocin ( $p$ -value  $< 0.05$ ). While on anxiety and contractions, moment comes no ( $p$ -value  $> 0.05$ ). The duration of contractions in the second hour is the factor most affected by adjusted R Squared (57.7%).

## 4. Discussion

Research shows that consuming dates at the end of pregnancy for 14 days with a weight of 70 g has an effect on oxytocin level childbirth, discharge colostrum, duration of contractions, pain labor, duration of the first, second, and third stage of labor compared to the control group. Besides that, cervix dilatation while entering the delivery room, anxiety, intact membrane, the amount of contractions, APGAR Score in minutes first, and the placenta completion did not show a significant difference. However, they own more results compared to the control group. Enhancing a significant rate of oxytocin in the group intervention can increase the contraction of the uterus and effectively stimulate the cervix to thin and open. Of course, this reduces the use of energy by the mother and causes the duration of childbirth to be short until the opening is complete detachment of the placenta.

On the review, using dates on the woman's pregnancy shows no toxicity nor danger to the fetus and mother, so it is valued as safe for therapy at the end of pregnancy [8]. Consumption of fruit dates can reduce the duration of pregnancy, increase the dilation of cervix moments entering the delivery room, and reduce the duration of labor in the first and second stages of childbirth [15]. Supported studies previously state that using dates, a shorter delivery process, can also reduce the use of oxytocin and the amount of blood in labor [12, 25].

However, the effect of hemoglobin levels during labor also plays a role in labor contractions, blood loss, and other status hemodynamics, especially in anemic pregnant women who are at risk of experiencing postpartum bleeding so that contractions are weaker [26].

Due to the mother's intake of dates during labor, the date group's labor lasted less time overall. Due to their high carbohydrate content, mainly fructose and glucose, dates can assist pregnant women in producing and conserving energy. The World Health Organization (WHO) recommends that pregnant women consume food and drinks to help their bodies refuel before giving birth [6]. The sugar content of dried dates is 64.1 g/100 g, and dates contain 23 types of amino acids [27]. More amino acids, including glutamic acid, aspartic acid, glycine, proline, and leucine, are present in dried dates. According to this element Carbohydrates, dates have a glucose content that ranges from 35.57 to 77.88 g/100g [12]. The role of carbohydrates and amino acids is critical in forming energy in mitochondria to maximize contraction strength during labor [28]. Although the consumption of dates can increase postprandial glucose, it does not significantly affect fasting blood glucose levels. Women who consumed six dates daily for four weeks before giving birth had significantly less need for labor induction and delivered more quickly.

Dates include tannins, Prochcidas enzymes, linoleic acid, iron, calcium, serotonin, and serotonin. Additionally, dates contain vitamins (A, B1, B2, B3, B6, B9, and C) crucial for DNA synthesis, the metabolism of carbohydrates, fats, and proteins, as well as antioxidants to protect tissues from oxidative stress. The abundance of insoluble fibers in dates' meat, including cellulose, hemicellulose, pectin, and lignin, is crucial for the digestive system's health and lowers inflammation[29, 30].

In this study, oxytocin levels in the intervention group were higher than oxytocin in the control group ((67.36

(13.21); 81.02 (18.34),  $p$ -value  $<0.05$ ). A systematic review explained that plasma-extracted oxytocin levels were between 17-85 pg/ml during labor [31]. Endogenous oxytocin is synthesized in the hypothalamus and plays a role in the initiation, increase, and frequency of uterine contractions through the smooth muscle of the uterus [32]. Studied in mice showed an increase in oxytocin levels in pregnant rats compared to those not given the intervention of ajwa dates [33]. Dates can increase the effect of oxytocin (which helps the uterus to contract) and increase uterine sensitivity. Saturated and unsaturated fats in dates provide the energy and prostaglandins needed for labor. Serotonin, calcium, and the tannins in dates help contract the uterine muscles. Dates alter the oxytocin receptors and improve how well the uterine muscles react to oxytocin, making uterine contractions more powerful. 200–300 times more oxytocin receptors are present during pregnancy, especially toward the end. The myometrium becomes more sensitive to oxytocin due to this rise in concentration. Anxiety is reduced by activating oxytocin receptors in the central nervous system, and then labor begins, progresses, and accelerates [12].

This study showed that colostrum expenditure in the intervention group was significantly higher than in the control group. This could be due to higher levels of oxytocin in milk production. Breast milk can come out more because oxytocin is a hormone that can secrete breast milk after being produced by the hormone prolactin.

In addition, the effect of endogenous oxytocin can also reduce stress on anxiety, which shows that anxiety is lower in the intervention group, although it is not significant. Anxiety stress can prolong the duration of labor and cause lower oxytocin levels [34]. Endogenous oxytocin can reduce stress because this study's labor pain score was lower than previous studies [35]. It has been shown that oxytocin levels can lead to more effective pain relief than synthetic oxytocin which cannot [34]. This is caused by endogenous oxytocin blocking  $\beta$ -adrenergic receptors, thereby increasing endorphins in plasma and opioid receptors in the brain and reducing pain. In line with rat models, oral intake of dates (250 and 500 mg/kg) moderated the analgesic properties associated with trans-ferulic acid. Dates inhibit pro-inflammatory MTT, LPO, and COX-1 enzymes, decreasing prostaglandin synthesis and inflammation [15]. This decrease in prostaglandins causes lower labor pain [36, 37]. Supported by previous research, date syrup can reduce labor pain and duration of labor, but the content of dates that affect labor pain cannot be further explained [11].

In this study, the APGAR score in the first minute in the intervention group was higher, although insignificant, whereas, in the fifth minute, there was no significant difference. The APGAR score indicates the well-being of the fetus at delivery. The high APGAR score in the first minute in the intervention group is related to the shorter duration of labor. However, the study duration in both

groups was still within normal limits, so it was not significantly significant. In contrast to previous research, it was found that pregnant women who consumed seven dates with drinking water during labor affected the APGAR score for newborns compared to only consuming or not consuming them [38].

The use of second oxytocin in the third stage of labor in both groups and the placenta's completeness were insignificant. The results of this study showed no complications in childbirth. Using a second oxytocin after 15 minutes of the placenta not being born has become a standard operating procedure in routine delivery care in Indonesia. An incomplete placenta is subject to placental exploration [20]. The use of synthetic oxytocin is more widely associated with disrupting emotional relationships in mothers and children and breastfeeding problems [32].

This study has several limitations, including educating patients to come to the delivery room when experiencing signs of labor. However, we did not estimate the duration of the latent phase of labor. Therefore, this cannot be verified objectively from the start of labor. Likewise, the intervention date depends on the mother's compliance in consuming it. The intervention group paid more attention because we expected obedience in consuming dates. However, we researchers must also address other pregnancy-related complaints that may influence birth outcomes. This study did not assess bleeding as a result of this delivery. The revealed Manova model uses more than six variables in some subjects, thus allowing for positive and negative bias. In addition, this study did not include psychosocial and spiritual factors that might influence the research results. This research needs to be continued to obtain a more comprehensive sample to generalize to more significant subjects.

## 5. Conclusions

Consumption of dates at the end of pregnancy can be significant in increasing oxytocin levels, expelling colostrum, increasing the duration of labor contractions, and decreasing the duration of labor and lower labor pain. Dates are the most effective on the duration of contractions in the second hour. This study answers the hypothesis in previous studies, which explained that dates might increase natural oxytocin to stimulate uterine contractions and cervical dilatation from term to delivery. The presence of natural oxytocin can reduce the need for oxytocin in labor. It is necessary to continue studies on the consumption of dates in answering the limitations of the research and the effectiveness of dates in the long term.

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