

## Effect of Date Palm (*Phoenix dactylifera*) Fruits Consumption on Birth Delivery Outcome: Meta-Analysis

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### ABSTRACT

**Background:** The choice of caesarean section continues to increase in the world and is expected to continue to increase over the coming decades, which is almost a-third of all deliveries in 2030. The benefits of dates for improving labor processes are considered to increase vaginal deliveries and also reduce the frequency of caesarean section with the aim of reducing bigger complications. This study aims to analyze and estimate the influence of consumption of dates on labor outcomes.

**Subjects and Method:** This study is a systematic review and meta-analysis with PICO, P: Pregnant women, I: consumption of dates, C: No consumption dates, O: Bishop's score, length of labour, and postpartum hemorrhage. Data collection was obtained from databases, namely: PubMed, Science Direct, Springer Link and Google Scholar. Keywords used "date fruit" OR "date palm" OR "phoenix dactylifera" AND "labor" AND "delivery", AND "oxytocin" AND "hemorrhage". The inclusion criteria used were full papers in English with the design of randomized controlled trials in 2000-2022. This study was analyzed using RevMan 5.3 software.

**Results:** Meta-analysis was conducted on 4 primary studies from several countries such as Iran, Malaysia and Saudi Arabia with a sample size of 603 pregnant women. The meta-analysis concluded that there was an effect of dates consumption on cervical dilatation upon admission to the hospital (SMD= 0.73; CI 95%= 0.09 to 1.38; p=0.030). Consumption of dates also has an effect on the duration of active 1st stage labour (SMD=-0.46; CI 95%= -0.82 to -0.09; p=0.010). Consumption of dates has a weak effect on the length of stage II labor (SMD=-0.05; 95% CI= -0.88 to 0.78; p=0.910). In addition, the consumption of dates also has a weak effect on the length of stage III labor (SMD=0.16; CI95%=-0.46 to 0.79; p=0.610).

**Conclusion:** Consumption of dates has an influence on labor outcomes.

**Keywords:** phoenix dactylifera, dates, labor, postpartum hemorrhage, Bishop score

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### BACKGROUND

The latest research by the World Health Organization (WHO) showed that the choice of caesarean section continues to increase in the world, which now increased by 21% of all deliveries. This number is expected to continue to increase over the coming decades,

which is nearly a third of all deliveries in 2030 (WHO, 2021). Meanwhile in Indonesia, the number of cesarean sections that occurred was around 17.6% of all recorded normal deliveries (Basic Health Research, 2018; IDHS 2017). Several complications for mothers during childbirth who are at high

risk which need to do a cesarean section namely premature rupture of membranes (5.6%), prolonged labor (4.3%), fetal position (3.1%), umbilical cord wrapped around the fetus (2.9%) and hypertension (2.7%) (Basic Health Research, 2018).

Prolonged labor or dystocia is one of the causes of cesarean section. Prolonged labor is an important thing to pay attention to, especially in developing countries because it is associated with death and maternal and fetal disorders. Impacts that can occur in prolonged labor are uterine atony, tearing of the uterine wall, fistula formation, pediatric sepsis, asphyxia, and shock. One of the causes of prolonged labor is abnormal uterine contractions. Inadequate contractions are the most common cause of prolonged labor. This has the risk of increasing the number of cesarean sections.

Contractions that are not normal in terms of strength and nature will interfere with the delivery process. Normally, contractions are able to make changes to the cervix, namely thinning and opening. Therefore contractions play an important role in helping the fetal head descend (Paramita et al., 2021; Kordi et al., 2017). As a result of inadequate contractions other than prolonged labor, namely uterine atony, postpartum hemorrhage and fatigue in the mother (Riyanto, 2014). Postpartum haemorrhage in Indonesia has reached a quite large number by 2.4% of the number of births recorded (Basic Health Research, 2018).

Inadequate contractions can be caused by a lack of nutrition during childbirth, however, during the birth process in stage 1 the mother is still allowed to eat and drink as she wishes as long as she is not at high risk of needing anesthesia. Consumption of carbohydrates during delivery can reduce the risk of labor induction and caesarean section (Zaher et al., 2021). At the end of pregnancy, the prolactin hormone in the body will incre-

ase so that pregnant women will feel that they need more nutrition. Energy will be stored in the body and can be used during childbirth (Kordi et al., 2017).

The mother's diet, especially in the 3rd trimester of pregnancy, is considered as an important factor for the current and future pregnancy outcomes and health of the mother and her child. Previous studies have suggested various dietary patterns for pregnant women to prevent and reduce maternal and newborn complications. Recently, there has been increased interest in the oral intake of natural substances such as fruits during pregnancy and also in the postpartum period to improve pregnancy outcomes. It is very important to consider the potential efficacy of fruits in the prevention and reduction of pregnancy complications, especially fruits that have been emphasized by tradition and religion but whose therapeutic properties have not been elaborated with appropriate investigations of interventions (Nasiri et al., 2019).

Carbohydrates are considered as an important source of energy in the body which has the highest digestibility among the food groups. Dates are a nutritious fruit made up mostly of simple sugars. Most of the energy used during labor is supplied through oxidative pathways. Maternal glucose is the most important source of energy. The physiological requirement for glucose during labor is 10 grams per hour. Sufficient energy sources are needed to maintain one's physical strength during labor activities, and consuming dates at the end of pregnancy and during labor can help in supplying and saving energy. Dates have an important significance in saving energy and overcoming fatigue and hunger due to their high level of calories (Kordi et al., 2017).

Dates contain glucose and fructose sugar which are useful for providing energy quickly. Absorption of glucose and fructose by the

body is faster than glucose only. Glucose will quickly rise to replace the energy lost during labor. After that glucose will quickly fall and be replaced by fructose which is slower to rise and fall. Therefore, the synergy of the two produces stable maternal strength during the delivery process (Rahayu, 2017).

Dates contain fatty acids in fruit and seeds, saturated and unsaturated fatty acids. Saturated and unsaturated fatty acids such as oleic and linoleic acids in dates play an important role in the production of prostaglandins apart from contributing to providing energy (Baliga et al., 2011). Increased prostaglandin levels in late pregnancy cause uterine contractions. Therefore, consumption of dates can help in conserving energy and strengthening uterine muscles. This fruit also contains hormones that help the uterus stretch and prepare to give birth to a baby. Eating dates really helps to strengthen the uterine muscles. Thus, it prevents postpartum hemorrhage, spontaneous labor and accelerates the progress of labor (Ahmed et al., 2018).

This study aims to review studies that investigated the effects of dates on labor outcome compared to the treatment of pregnant women in general.

## SUBJECTS AND METHOD

### 1. Study Design

This research is a systematic review and meta-analysis. Data collection was obtained from several databases, namely: PubMed, Science Direct, Springer Link and Google Scholar. The keywords used were “date fruit” OR “date palm” OR “phoenix dactylifera” AND “labor” AND “delivery”, AND “oxytocin” AND “hemorrhage”.

### 2. Steps of Meta-Analysis

Meta analysis was carried out in 5 steps as follows:

- 1) Formulate research questions in PICO format (Population, Intervention, Control/Comparisons, Outcomes)
- 2) Looking for primary study articles from various electronic and non-electronic data based such as PubMed, Google Scholar, Science Direct, SCOPUS and so on
- 3) Perform screening to determine inclusion and exclusion criteria and carry out critical assessments
- 4) Extract the data from the primary study and synthesize the effect estimates using the Revman 5.3 application
- 5) Interpret the results and draw conclusions

### 3. Inclusion Criteria

The inclusion criteria in this study were articles using a study design of randomized controlled trials, the measure of effect used was the Mean and Standard Deviation, full paper articles in English with the year of publication from 2000 to 2022. The research subjects were pregnant women who consumed dates. The comparison is not consuming dates.

### 4. Exclusion Criteria

Exclusion criteria in this study were articles published in languages other than English and Indonesian, not full-text, articles with quasi-experimental study designs, protocol studies, pilot studies, cohorts, case control and cross-sectional.

### 5. Operational Definition of Variables

The articles included in this study were adjusted according to the PICO. P= pregnant women. I= comparison consumption of dates. C= not consumption of dates. O= (Bishop score, length of labour, and postpartum hemorrhage).

**Consumption of Dates** is consuming dates in late pregnancy.

**Bishop Score** is a tool to measure cervical maturity with 5 assessment characters.

**Length of Labor** is the duration of labor from the beginning of the 1st stage of the active phase until the placenta comes out.

**Number of postpartum hemorrhage** is the amount of blood that comes out after the placenta comes out until the end of the fourth stage of labor.

**6. Study Instruments**

Quality assessment in this study used the Critical Appraisal Tools Randomized Controlled Trials by the Center for Evidence Based Management (CEBM) University of Oxford (2014).

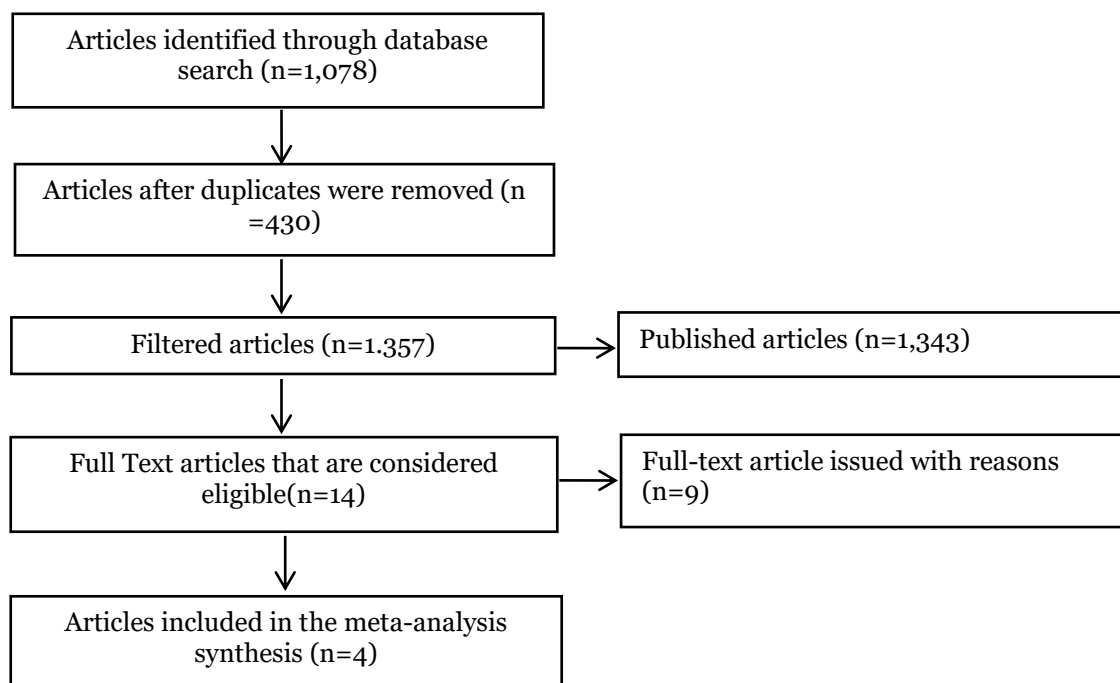
**7. Data Analysis**

Articles were collected based on PRISMA flow diagrams and Critical Appraisal. Data analysis in this study used the Review Manager 5.3 application.

cles were excluded due to multiple data. After the multiple article screening process, 1,357 articles were obtained, 13 of which met the requirements for further full text review. Articles were selected according to the inclusion requirements. The final results of the article review obtained 4 articles that fulfilled the quantitative requirements for meta-analysis, namely the effect of consumption of dates on labor outcomes. Research related to the effect of consumption of dates on labor outcomes comes from the Asian continent, namely Malaysia, Iran, and Saudi Arabia. The quality and design of the studies analyzed in the meta-analysis is very important because it influences the results. Assessment of the quality of the study was carried out quantitatively and qualitatively. This research uses Critical Appraisal Tools Randomized Controlled Trials by the Center for Evidence Based Management (CEBM) University of Oxford (2014).

**RESULTS**

The initial search process obtained 2,217 articles from several databases. Then 860 arti-



**Figure 1. PRISMA flowchart diagram of therapy article search acupressure on blood sugar levels in diabetes mellitus patients**



**Figure 2. Description of the Study Area**

**Table 1. The results of the quality assessment of the Randomized Controlled Trial study on the effect of dates on labor outcomes**

Author (Year)	Question Criteria												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
Kordi et al. (2014)	1	1	1	1	1	1	1	1	1	1	0	1	11
Kordi et al. (2017)	1	1	1	1	1	1	1	1	1	1	0	1	11
Razali et al. (2017)	1	1	1	1	1	1	1	1	1	1	0	1	11
Ahmed et al. (2018)	1	1	1	1	1	1	1	1	1	1	0	1	11
Khadem et al. (2007)	1	1	1	1	0	1	1	1	1	1	0	0	9

**Description of the question criteria:**

- 1 = Does this study address a clear research focus?
- 2 = Is the Randomized Controlled Trials research method suitable for answering research questions?
- 3 = Are there enough subjects in the study to determine that the findings were not made by chance?
- 4 = Are the subjects randomly allocated to the experimental and control groups? If not, could this introduce bias?
- 5 = Are inclusion/exclusion criteria used?
- 6 = Are the two groups comparable at the start of the study?
- 7 = Are objective and unbiased outcome criteria used?
- 8 = Are objective and validated measurement methods used to measure the results? If not, were the results assessed by someone who was not aware of the group assignment (i.e. were the ratings blinded)
- 9 = Is the effect size practically relevant?
- 10 = How precise is the estimated effect? Are there confidence intervals?
- 11 = Could there be confounding factors that haven't been taken into account?
- 12 = Are the results applicable to your study?

**Description of the answer score:**

- 0 = No
- 1 = Yes

**Table 2. Summary of randomized controlled trial (RCT) primary study articles with each PICO (N=451)**

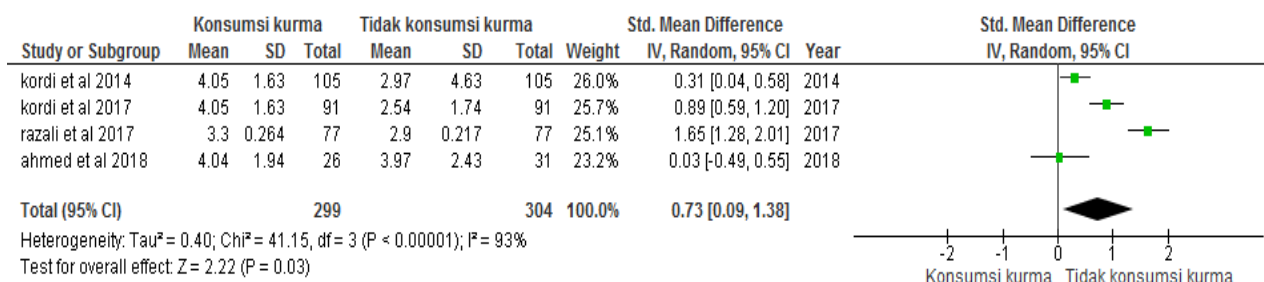
Author (Year)	Country	Sample Size	P (Population)	I (Intervention)	C (Comparison)	O (Outcome)
Kordi et al. (2014).	Iran	210	Nulliparous pregnant women at 37-38 weeks' gestation with a single fetus and cephalic presentation. Mothers aged 18-35 years old and have a low risk of complications.	Consumption of ruthob dates by 70-75 grams per day until the start of labor.	Do not consume dates	Bishop score and labor outcome
Kordi et al. (2017).	Iran	182	Nulliparous pregnant women aged 18-35 years old with a gestational age of 37-38 weeks, single fetus and have no health and uterine problems.	Consume 70-75 grams of mazafati dates (6-7 pieces) per day until the start of labour.	Do not consume dates	Labor Outcome
Razali et al. (2017).	Malaysia	154	Nulliparous pregnant women at 37 weeks' gestation with a single fetus and no health problems and have a low risk of pregnancy complications.	Consume 80 grams of dates (7 pieces) per day until entering the active phase of labour.	Do not consume dates	Labor Outcome
Ahmed et al. (2018).	Arab	89	Maternity with low risk of pregnancy complications.	Consume rotana ruthob dates without water.	Do not consume dates	Labor Outcome

**Table 3. Effect estimates (Mean SD) of all primary studies performed in the meta-analysis (N=451)**

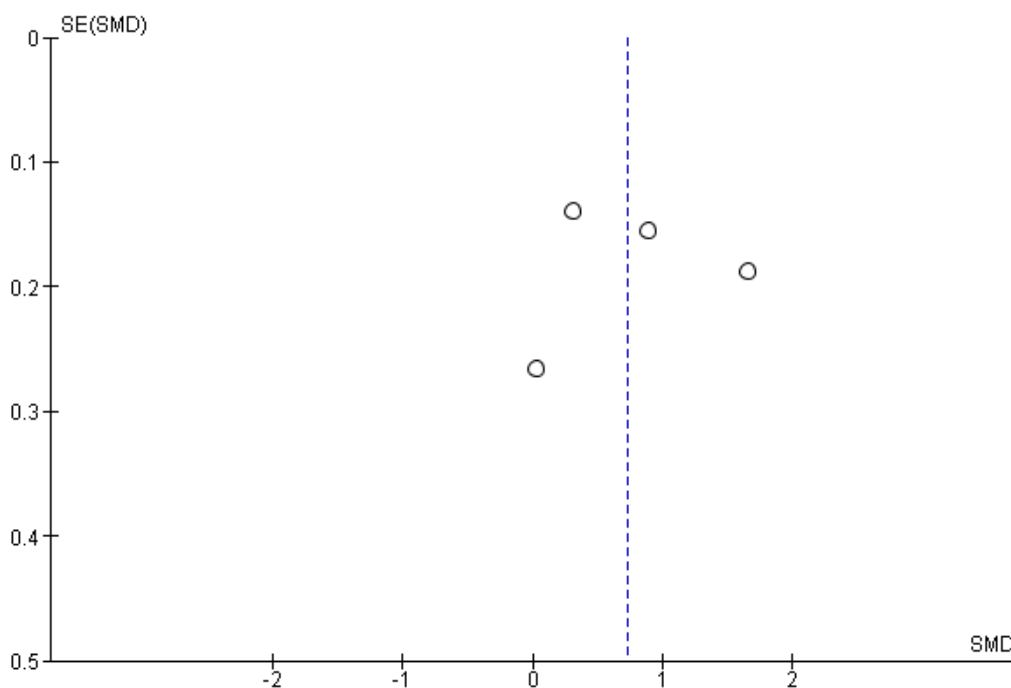
Author (Year)	Consumption of dates		Non-Consumption of dates	
	Mean	SD	Mean	SD
Kordi et al. (2014)	4.05	1.63	2.97	4.63
Kordi et al. (2017)	4.05	1.63	2.54	1.74
Razali et al. (2017)	3.30	0.26	2.9	0.22
Ahmed et al. (2018)	4.04	1.94	3.97	2.43

Table 3. showed the Mean SD for each selected article. It is necessary to pay attention to the collection of articles by selecting articles that have controlled for confounding fac-

tors, which can be seen from the inclusion requirements of the study, namely a randomized control trial (RCT).



**Figure 3. Forest plot of date consumptions effects on cervical dilation in hospital admission**

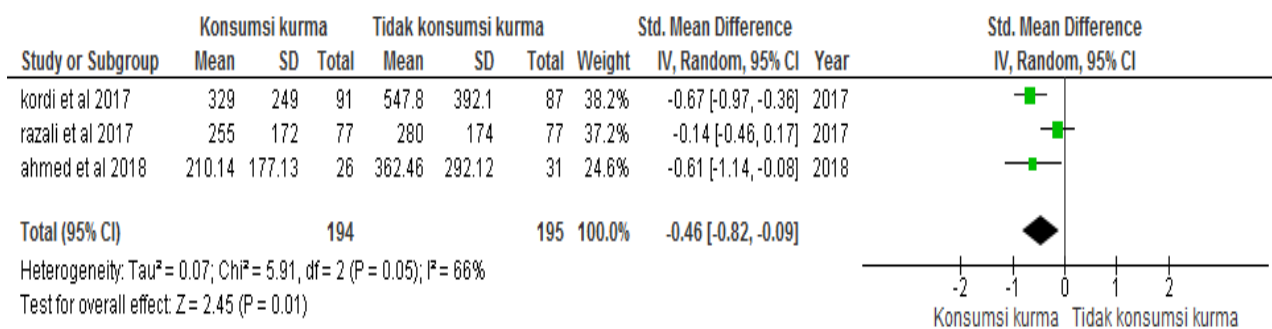


**Figure 4. Funnel plot of date consumptions effects on cervical dilation in hospital admission**

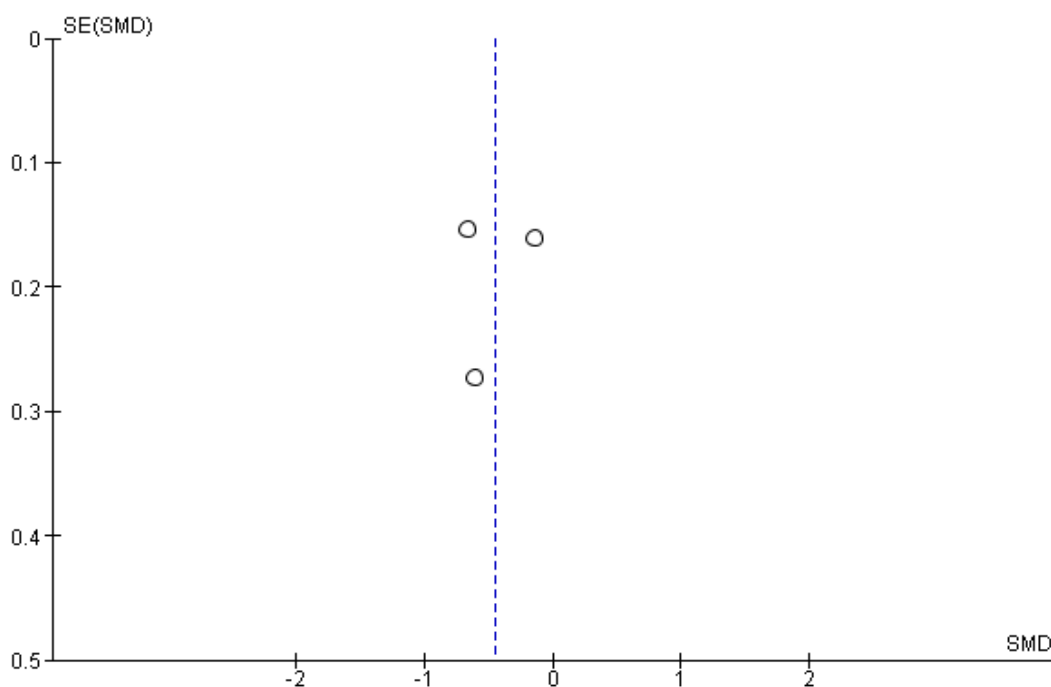
The forest plot in figure 3 showed that there was an effect of consuming dates on cervical dilatation, and this effect was statistically significant. Pregnant women who consumed dates experienced an average cervical dilation of 0.73 units wider than those who did not consume dates (SMD = 0.73; CI<sub>95%</sub> = 0.09 to 1.38; p = 0.030). The forest plot also showed high heterogeneity of effect esti-

mates between studies (I<sup>2</sup> = 93%; p < 0.001) thus the average effect estimate was calculated using the Random Effect Model approach.

Figure 4 showed that the distribution of effect estimates was more or less symmetrical to the right and left of the average vertical line of estimation, therefore, it did not indicate publication bias.



**Figure 5. Forest plot of effects of date consumptions on the length of labor in the active stage I**



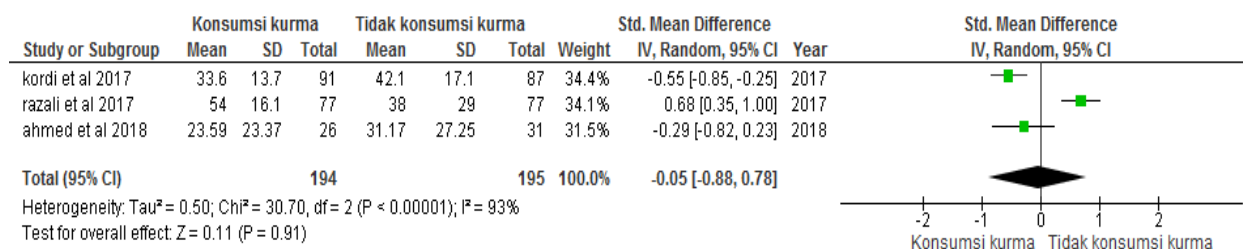
**Figure 6. Funnel plot of effects of date consumptions on the length of labor in the active stage I**

Forest plot in figure 5 showed Pregnant women who consume dates have an average length of labor in the active first stage by 0.46 units faster than those without consumption of dates (SMD= -0.46; 95% CI=-0.82 to -0.09; p=0.010). The forest plot showed high heterogeneity of effect estimates between studies (I<sup>2</sup>=66%; p=0.050) thus the average effect estimate

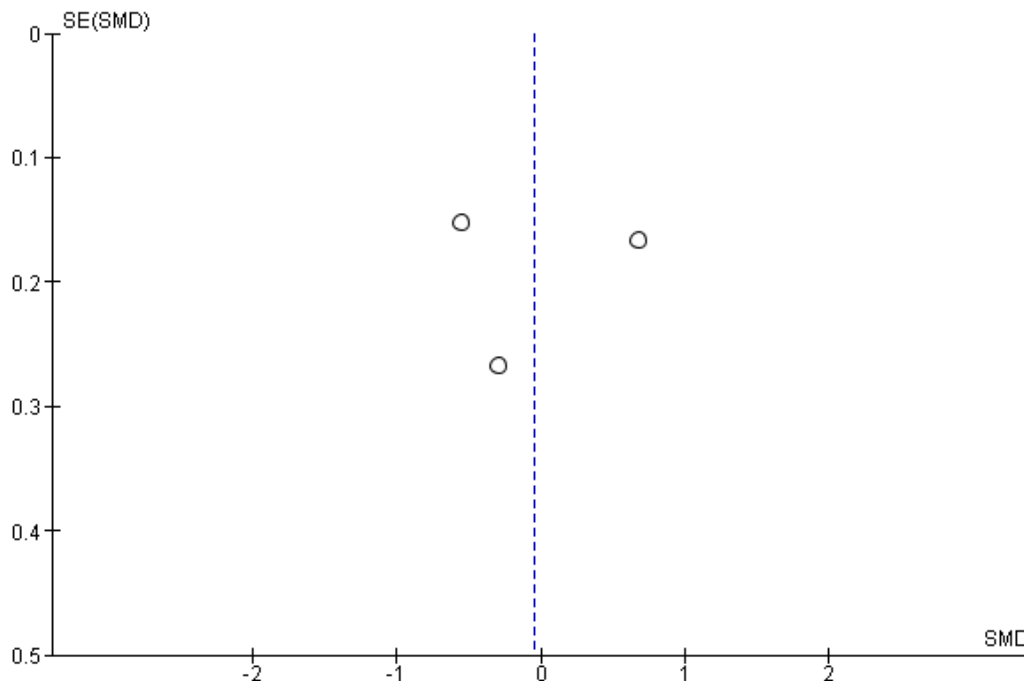
was calculated using the Random Effect Model approach.

Based on Figure 6, it showed that the distribution of effect estimates was more or less symmetrical to the right and left of the average vertical line of estimation, so it did not indicate publication bias.





**Figure 7. Forest plot of effects of date consumptions on the length of labor in the stage II**

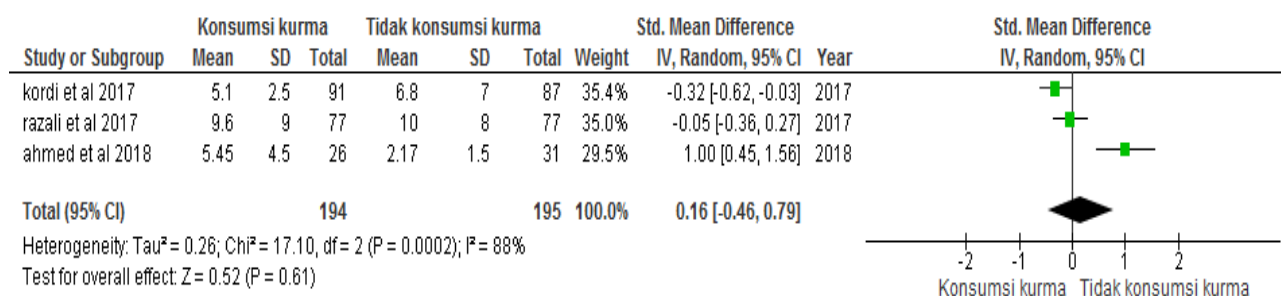


**Figure 8. Funnel plot of effects of date consumptions on the length of labor in the stage II**

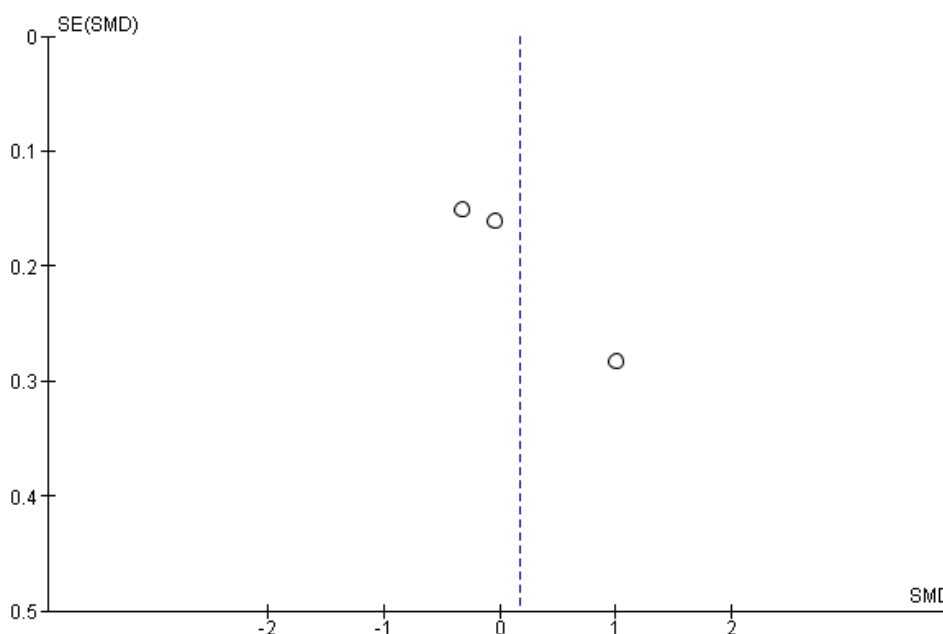
Forest plot in figure 7 showed that there was a very weak effect of consuming dates in shortening the second stage of labour, and was not statistically significant. Pregnant women who consume dates have an average length of labor in the second stage by 0.05 units faster than those who did not consume dates (SMD=-0.05; CI95%=-0.88 to 0.78; p=0.910). The forest plots showed

high heterogeneity of effect estimates between studies (I<sup>2</sup>=93%; p<0.001) thus the average effect estimate was calculated using the Random Effect Model approach.

Figure 8 showed that the distribution of effect estimates was more or less symmetrical to the right and left of the average vertical line of estimation, therefore, it did not indicate publication bias.



**Figure 9. Forest plot of effects of date consumptions on the length of labor in the stage III**



**Figure 10. Funnel plot of effects of date consumptions on the length of labor in the stage III**

Forest plot in figure 9 showed a weak effect of date consumption on the length of stage III labour, and is not statistically significant. Pregnant women who consumed dates experienced a length of labor in the third stage by 0.16 units faster than those who did not consume dates (SMD=0.16; 95% CI=-0.46 to 0.79; p=0.610). The forest plot also showed high heterogeneity between studies (I<sup>2</sup>=88%; p<0.001) so that the average effect estimate was calculated using the Random Effect Model approach.

Based on Figure 10, it showed that the distribution of effect estimates was more or less symmetrical to the right and

left of the average vertical line of estimation, so it did not indicate publication bias.

### DISCUSSION

This research is a meta-analysis study. The purpose of this study was to draw conclusions from the results of various similar studies that examined the effect of consumption of dates in pregnant women on labor outcomes. The primary studies involved in this study were studies conducted in various countries around the world. So that it can draw conclusions that can be applied as a basis for intervention. In the current review, the authors summa-

alize the findings of previous studies on the effect of date fruit consumption on labor outcomes. Based on the history of Islamic medical literature and some anecdotal evidence, dates either alone or in combination with other foods have been suggested to be consumed as a proper nutritious food by pregnant women before and after delivery.

Based on the results of a systematic review, the authors revealed that consuming dates had a significant effect on the number of postpartum hemorrhages than not consuming dates. This is similar to a study conducted by Khadem et al (2007) which compared dates with oxytocin in controlling postpartum hemorrhage, it was found that consuming dates significantly reduced the amount of bleeding compared to giving oxytocin in the first hour of labor followed by expulsion of the placenta. There are compounds in dates that mimic how oxytocin works. Consumption of dates in late pregnancy also reduces the need for labor induction, and the spontaneous onset of labor is higher. These results are similar to studies conducted by Kordi et al in 2014 and 2017, which showed that pregnant women who consumed dates started normal labor faster (seen from the gestational age at delivery) and were given less oxytocin than pregnant women who did not consume the fruit. The following variables were also significantly higher in mothers who consumed dates, namely Bishop's score at admission (cervical effacement at admission, cervical consistency at admission, cervical position at admission, and fetal position at admission). Study by Kordi et al (2014) gave similar results, namely pregnant women who consumed dates at the end of their pregnancy had a greater Bishop value compared to pregnant women who did not consume dates.

Based on this meta-analysis study,

the results of the forest plot show that there was an effect of consumption of dates on cervical dilatation upon admission to the hospital, and this effect was statistically significant. Pregnant women who consumed dates experienced cervical dilation upon admission to the hospital by 0.73 wider than pregnant women who did not consume dates (SMD=0.73; CI95%= 0.09 to 1.38; p=0.030). Forest plots also show high heterogeneity of effect estimates between studies ( $I^2=93\%$ ;  $p=0.001$ ). Kordi et al (2017) conducted a randomized controlled trial with 182 samples of pregnant women and concluded that women who were given the date palm intervention experienced better cervical dilatation than women who were not given the intervention. This meta-analysis study also showed that there was an effect of consumption of dates on the duration of the active 1st stage of labor, and this was statistically significant. Pregnant women who consumed dates experienced an active 1st stage of labor by 0.46 times faster than pregnant women who did not consume dates (SMD= -0.46; CI95%= -0.82 to -0.09; p= 0.010). Forest plots also show high inter-study effect estimates ( $I^2= 66\%$ ;  $p=0.05$ ). Meanwhile, this study showed that there was a weak effect of consumption of dates on the duration of the second stage of labor (SMD= -0.05; 95% CI= -0.88 to 0.78; p= 0.910) and the duration of the third stage of labor (SMD=0.16; 95% CI= -0.46) up to 0.79; p=0.610). Research by Kordi et al (2017) showed similar results, that the consumption of dates had an effect on the duration of labor. The duration of active stage I, stage II and stage III in pregnant women who consume dates is significantly faster than not consuming dates.

### AUTHORS CONTRIBUTION

Ratna Purwani Siwi is the main researcher who selected the topic, searched and collected research data. Bhisma Murti and Didik Gunawan Tamtomo analyzed the data and reviewed research documents.

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### CONFLICT OF INTEREST

There is no conflict of interest in this study.

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