Journal of Midwifery & Reproductive Health

JMRH.mums.ac.ir

The Effect of Late-Pregnancy Consumption of Date Fruit on Cervical Ripening in Nulliparous Women

Masoumeh Kordi (MSc)[1], Fatemeh Aghaei Meybodi (MSc)[2], Fatemeh Tara (MD)[3], Mohsen Nemati (PhD)[4], Mohammad Taghi Shakeri (PhD)[5]

[1] Lecturer, Department of Midwifery, School of Nursing and Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran
[2] Graduate, MSc in Midwifery, School of Nursing and Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran
[3] Associate Professor in Obstetrics and Gynecology, Women's Health Research Center, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
[4] Associate Professor of Nutrition, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
[5] Professor in Social Medicine, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

ARTICLE INFO

Article type:
Original article

Article History:
Received:16-Mar-2014
Accepted:22-Apr-2014

Key words:
Bishop score
Cervical ripening
Date fruit
Nuliliparous women

ABSTRACT

Background & aim: Cervical ripening before the onset of labor is an important factor for the prediction of delivery mode, and is directly associated with vaginal delivery. The search for a safe, inexpensive, and easy method of cervical ripening is of great significance. Few studies have focused on the effect of date fruit on uterine contractions and cervical ripening. Therefore, the purpose of this study was to determine the effect of late pregnancy consumption of date fruit on cervical ripening in nulliparous women.

Methods: This randomized clinical trial was performed on 210 women with a singleton pregnancy, cephalic presentation, and gestational age of 37-38 weeks. The study was conducted at Omolbanin Hospital, Mashhad, Iran in 2013. The subjects were randomly assigned into two groups of 105 women (experimental and control groups). Since the 37th week of gestation, the experimental group consumed date fruit (70 to 75 gr per day) until the onset of labor pain, and the control group received routine care. Data were collected using demographic questionnaires, fetal movement record form, and the checklist related to daily consumption of date fruit. Data analysis was performed using SPSS version 14, and Chi-square, t student, and Mann-Whitney test. P-value less than 0.05 was considered statistically significant.

Results: The mean Bishop score at admission was higher in the experimental group (7.67±2.28), compared to the control group (5.12±2.77) (P<0.001). Mean cervical dilatation at admission was 4.05±1.63 cm in the experimental group and 2.97±4.63 cm in the control group (P<0/05). Also the success rate of labor induction was higher in the experimental group compared to the control group (P=0.006).

Conclusion: Mean cervical dilatation was higher in women consuming date fruit, compared to the non-consuming group. Since date fruit is full of energy and nutrients, it is recommended for pregnant women to help with cervical ripening, particularly in the last weeks of gestation.

► *Please cite this paper as:*
Kordi M, Aghaei Meybodi F, Tara F, Nemati M, Shakeri MT. The Effect of Late-Pregnancy Consumption of Date Fruit on Cervical Ripening in Nulliparous Women. Journal of Midwifery and Reproductive Health. 2014;2(3): 150-156.

Introduction

Cervical ripening before the onset of labor is an important factor for the prediction of delivery mode, particularly in cases of labor induction. Increased cervical ripeness increases the likelihood of vaginal delivery and decreases the rate of cesarean section (1). For measuring cervical ripeness, Bishop scoring system can be used, which includes the rating of five components: cervical dilatation, effacement, position, and consistency, and fetal station in vaginal examination.

Higher Bishop score indicates higher cervical ripening and increased likelihood of vaginal delivery (1-3). Normally, Bishop score ≤ 5 indicates an unfavorable cervix, and Bishop score ≥ 8 indicates a high likelihood of spontaneous labor (3). According to the study of Williams et al. (1997), the ratio of cervical

* *Corresponding author:* Fatemeh Aghaei Meybodi, School of Nursing and Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran. Email: aghaeimf901@mums.ac.ir

dilatation to total Bishop score and its components is a more reliable predictor of the success of labor induction and vaginal delivery (1, 2).

Changes related to cervical ripening usually occur during late pregnancy. In the last 6 to 8 weeks of pregnancy, through a process called "uterine awakening" or "activation", the myometrium stillness is suspended and the number of myometrial oxytocin receptors is considerably increased. As a result, the number and surface area of GAP junction proteins such as connexin 43, also increase and uterine is prepared for labor contractions.

In addition, at about 34-36 weeks of gestation, the levels of estrogen and progesterone hormones change within 5 weeks (2, 4). These changes together increase uterine irritability and its responsiveness to contraction-stimulating factors. Another important change in the myometrium is the formation of the lower uterine segment. At this stage, the cervix loses its integrated structure, and therefore, it becomes soft and dilated as soon as strong contractions begin (1, 4).

For a favorable cervical ripening, 1600 mmHg pressure is required, while if the cervix is not prepared, the pressure should increase to 10,000 mmHg (a 5-fold increase) (5). The exact mechanism of cervical preparation is unknown. However, several methods of cervical ripening have been introduced according to various theories including changes in estrogen and progesterone hormone levels, increased production of prostaglandins, increased sensitivity of the myometrium to oxytocin and prostaglandins, and interactions between these factors (1-4).

These methods include use of oxytocin and prostaglandins, mechanical surgery, and natural methods; oxytocin is the most common agent used worldwide (6, 7). Although the use of oxytocin is considered an effective method for cervical ripening, it is associated with multiple adverse side effects such as uterine hyperstimulation, intoxication with water, postpartum hemorrhage, embolism of amniotic fluid, and neonatal jaundice.

An ideal agent for cervical ripening should prepare the cervix for delivery with minimum complications for the mother and the fetus (8). Natural non-drug methods, including non-invasive techniques, are more effective, more economical, and safer than pharmacological methods. Current non-drug methods include castor oil, evening primrose oil, raspberry leaf, sisymbrium irio (London rocket), and date fruit (9).

Studies have shown that date fruit, a reinforcing fruit rich in carbohydrates, affects the progress and spontaneity of labor and reduces postpartum hemorrhage (10-12). Date is a reinforcing fruit rich in carbohydrates; these carbohydrates are simple sugars, absorbed and used by the cells shortly after consumption. Date fruit also contains vitamin B, iron minerals, calcium, magnesium, and potassium. Today, various studies have been conducted on different varieties of date fruit and many of its nutritional and health benefits have been determined (13-15).

In a study, the effect of date pollen on serum hormone levels was examined in female adult rats. The results showed that palm pollen extract can increase estrogen and progesterone levels in rat sera, but has no effect on Luteinizing hormone or follicle-stimulating hormone (16). It was also found that the consumption of date fruit increases the pain threshold and its intake in late pregnancy is recommended to accelerate labor (17).

Date fruit contains saturated and unsaturated fatty acids such as oleic, linoleic, and linolenic acids. Fatty acids in addition to providing and reserving energy, contribute to prostaglandin provision (15); therefore, date fruit can be helpful in saving energy and strengthening uterus muscles. It also contains hormones which help the uterus stretch and be prepared for child delivery (18).

According to the results of Alkoran and colleagues (2011), cervical dilatation on admission was higher in the group consuming date fruit during late pregnancy, compared to the non-consuming control group ($P<0.0005$). It seems that date fruit influences oxytocin receptors, stimulates the uterine muscles to respond more comfortably to oxytocins, and better prepares the uterus and cervix for delivery (10). Khadem et al. (2007) demonstrated that date fruit has oxytocin-like effects and its nutritional and therapeutic character-

ristics reduce postpartum hemorrhage; it can also be a suitable alternative for oxytocin (12).

Given that the number of oxytocin receptors elevates in the last months of pregnancy, which itself leads to an increase of uterine sensitivity and contraction stimulation, date fruit can influence oxytocin receptors and accelerate the onset of uterine contractions more easily (10-12). Considering the limited research in this area and lack of such reports in Iran, we aimed to determine the effect of late-pregnancy consumption of date fruit on cervical ripening in nulliparous women.

Materials and Methods

This clinical trial was performed from 6th April to 2nd September 2013 on 210 primiparous women, referring to Mashhad Omolbanin Hospital, Iran. To calculate the sample size, a pilot study was performed on 20 patients. Then, considering α=0.01 and β=0.1, the sample size was calculated 96 cases in each group. Given a 10% loss of sample, 105 cases were included in each group (a total of 210 women).

First, the approval of the ethics committee of the university was obtained. After explaining the study objectives to the mothers and obtaining written consents (with regard to ethical principles for medical research), sampling was performed. The inclusion criteria were as follows: 1) primiparity, 2) 18 to 35 years of age, 3) 37-38 weeks of gestation, 4) singleton pregnancy with cephalic presentation, 5) lack of medical or gynecological problems, 6) no assisted reproductive technology (ART) pregnancy, and 7) non-elective cesarean section. Women in the intervention group, who used date fruit less than 2 weeks, were excluded from the study.

Considering the consumption of date fruit, the subjects were randomly divided into two groups: intervention and control groups (consuming and non-consuming groups, respectively). At the beginning of the sampling, week days from Saturday to Thursday were numbered 1 to 6. Then, using a table of random numbers, 3 days were randomly assigned to the intervention group and 3 days to the control group. Data collection tools included questionnaires, observation, physical examination, form of fetal movement record, and the checklist related to daily consumption of date fruit.

Validity of data collection tool was determined by content validity. The tools were provided as preliminary questionnaires with regard to literature and the latest related research. They were given to 10 members of the School of Nursing and Midwifery, Mashhad University of Medical Sciences, and were finalized after review and modification. Reliability of the questionnaire was confirmed by the inter-rater reliability with a correlation coefficient of 0.94.

The used date fruits were the products of Mazafati Rotab Dates, purchased from major food distribution centers in Mashhad, Iran. The intervention group weekly received 7 packets of 70-75 gr date fruit since the 37th week of gestation, and the mothers were asked to continue the consumption up to the onset of labor (70-75 gr per day in three divided doses). On the other hand, the control group was asked not to eat date fruit during this period and recevied routine care.

Subjects in both groups, after entering the study, were evaluated in terms of the onset of labor. During the study period, they were trained to avoid using enema, nipple stimulation, use of laxatives, herbal or chemical drugs, or traditional methods of labor induction. Also, the mothers received the forms of fetal movement record, in which the researcher's phone number (for emergency calls or asking questions) and the date and time of the subjects' enrollment (in the study) were recorded.

Each week, participants in both groups were examined by the researcher in terms of vital signs, weight, fetal heart rate, fetal movements, uterine spotting, bleeding and discharge, probable outcomes of date fruit (in the intervention group), and use of date fruit (in the control group); the data were recorded in the follow-up form.

The mothers in each group were trained regarding the signs of labor onset. They were asked to inform the researcher and refer to Omolbanin Hospital if there were any signs of labor onset. If delivery was not starting until 40 weeks of gestation, both groups were asked to refer to the clinic for delivery checkups and tests

of fetal health. If there were no problems in continuing the pregnancy in the control group, the mothers were trained about the signs of initiation of labor. In the intervention group, in addition to teaching these signs, they were advised to continue the consumption of date fruit.

If delivery was not starting until 41 weeks of gestation, the subjects were referred to the obstetrics ward for labor induction, where the researcher was present. After vaginal examination, the related details were recorded in the questionnaire and Bishop score was calculated for comparison between the groups. Data analysis was performed using SPSS version 14, and Chi-square and t-test. P value less than 0.05 was considered statistically significant.

Results

A total of 240 women were enrolled in the study. Five cases were excluded given their unwillingness to continue the study, 1 due to sensitivity to date fruit, 11 due to non-use of date fruit for at least two weeks, 9 due to labor induction before 41 weeks of gestation, and 5 due to gestational hypertension. Finally, 210 women remained in the trial.

The subjects were not statistically different in terms of mean age and body mass index (BMI). The mean age was 23.51 ± 3.67 years in the intervention group and 23.58 ± 3.73 years in the control groups (P = 0.89); also, the mean BMI was 22.88 ± 2.76 and 23.17 ± 2.67 kg/m^2, respectively (P= 0.44).

Based on Chi-square test, the two groups were not statistically different in terms of education level, history of abortion, history of prolonged pregnancy in first-degree relatives, history of bleeding and spotting during the first trimester of pregnancy, use of non-steroidal anti-inflammatory drugs, or mother's education level (Table 1). Also, 84.8% (n=89) of subjects in the intervention group and 96.2% (n=101) in the control group were housewives; the two groups were matched in terms of occupation (P=0.42).

The results of Mann-Whitney test showed that the mean Bishop score at admission was higher in the intervention group, compared to the control group; the mean Bishop score was 7.67 ± 2.28 in the intervention group and 5.12 ± 2.77 in the control group (P <0.001). The Bishop score > 5 at admission was more frequent in the intervention group, compared to the control group at various weeks of gestation (P<0.001) (Table 2).

Values of each Bishop scoring component (cervical dilatation, effacement, position, and

Table 1. Distribution of subjects in terms of history of abortion, prolonged pregnancy in first-degree relatives, spotting or bleeding during the first trimester of pregnancy, use of non-steroidal anti-inflammatory drugs, and maternal education level

Groups		Intervention		Control		Total		P-value (Chi-square)
		N	%	N	%	N	%	
History of abortion	Yes	12	11.4	9	8.6	21	10	P=0.49
	No	93	88.6	96	91.4	189	90	
History of prolonged pregnancy in first-degree relatives	Yes	6	5.7	12	11.4	18	8.6	P=0.33
	No	99	94.3	93	88.1	192	91.5	
Spotting or bleeding during the first trimester of pregnancy	Yes	21	20	16	15.4	37	17.7	P=0.38
	No	84	80	88	84.6	172	82.3	
Use of non-steroidal anti-pain medications	Yes	3	2.9	8	7.7	11	5.3	P=0.11
	No	102	97.1	96	92.3	198	94.7	
Maternal education level	Primary education (literate)	12	%11.4	16	%15.2	28	%13.3	P =0.12
	High school	27	%25.7	31	%29.5	58	%27.6	
	Secondary school	45	%42.9	49	%46.7	94	%44.8	
	University	21	%20	9	%8.6	30	%14.3	

Table 2. Distribution of subjects according to Bishop score at different gestational weeks

Bishop score	0-5				>5				Total		P-value (Chi-square)
	Intervention		Control		Intervention		Control				
	N	%	N	%	N	%	N	%	N	%	
Until 39 weeks	0	0	1	0.5	3	2.8	2	1	6	3	P<0.001
39-40 weeks	8	7.6	12	11.4	43	40.9	20	9.6	83	39.7	
40-41 weeks	7	6.6	18	17.1	43	40.9	26	13	94	44.7	
>41 weeks	1	0.5	24	22.8	0	0	1	0.5	26	12.6	

Table 3. Mean cervical dilatation and effacement at admission in each group

Variables	Groups	Mean ± SD	P-value (Mann-Whitney test)
Cervical dilatation	Intervention	4.05±1.63	P<0.001
	Control	2.97±4.63	
Cervical effacement	Intervention	51.92±3.28	P=0.008
	Control	38.12±2.37	

consistency, and fetal station) were statistically significant in the two groups (Tables 3 & 4).

The rate of vaginal delivery was higher in the intervention group, but the groups were not statistically different in terms of delivery mode (P=0.09); the rates of cesarean section and vacuum/forceps were 8.6% and 1.9% in the intervention group and 15.2% and 3.8% in the control group, respectively. The use of oxytocin for labor induction in the intervention group (20%) (n=21) was significantly less than the control group (44.8%) (n=47) (P<0.001). Also, the success rate of labor induction (vaginal delivery after labor induction) in the intervention group (47%) was higher than the control group (28%) (P= 0.036).

Discussion

The results of the current study showed that the mean Bishop score was significantly higher in the group who used date fruit in the last month of pregnancy, compared to the non-consuming group. The study of Alkoran et al. (2011), which evaluated the effects of date fruit on labor and delivery in nulliparous and multiparous women, showed that the mean of cervical dilatation at admission in the group, who used date fruit, was higher than the control group (P<0.005).

Also, in the study of Alkoran, occurrence of spontaneous labor was lower in the intervention group and these subjects required less labor induction. They noted that date fruit probably influenced oxytocin receptors, caused more effective contractions, and better prepared the cervix for delivery (10).

Iravani et al. (2006) performed a study with the aim to determine the efficacy and safety of castor oil in cervical ripening and labor induction. According to the results, spontaneous labor pain and mean Bishop score were significantly higher in the intervention group compared to the control group (P<0.001); in fact, castor oil, similar to date fruit, contains substances which can reinforce prostaglandin synthesis (19).

In addition, other substances such as evening primrose oil, raspberry leaf, and sisymbrium irio, given their prostaglandins and fatty acid precursors, have been assessed in several studies, and their effectiveness in cervical ripening has been shown. Based on the studies of Simpson et al. (2001), Mohammadinia et al. (2003), and Dow et al. (1999), use of raspberry leaf, sisymbrium irio, and evening primrose oil in late pregnancy positively affected cervical ripening, respectively (20, 21, 22).

Khadem et al. (2007), in a study by comparing the effects of date fruit and oxytocin in the prevention of postpartum hemorrhage, found that date fruit has an oxytocin-like effect, leads to the increased sensitivity of the uterus, stimulates uterine contractions, and reduces mean postpartum hemorrhage (12).

Date fruit contains saturated and unsaturated fatty acids such as oleic, linoleic, and linolenic acids, which are involved in saving and supplying energy and construction of prostaglandins. In addition, serotonin, tannin, and calcium in date fruit contribute to the

Table 4. Frequency distribution based on cervical consistency, cervical position, and fetal station at admission

Groups		Intervention		Control		Total		P-value (Chi-square)
		N	%	N	%	N	%	
Cervical Consistency	firm	1	1%	6	5.8%	7	3.3%	P=0.01
	medium	40	19.04%	67	64.4%	107	50.9%	
	soft	64	60%	31	29.5%	105	50.2%	
Cervical position	Posterior	10	9.5%	24	23.07%	30	14.35%	P=0.01
	mid-position	79	75.2%	67	64.4%	146	69.9%	
	inferior	20	19%	3	2.9%	23	11%	
Fetal station	-3	15	14.3%	40	38.1%	55	26.2%	P<0.001
	-2	63	60%	55	52.4%	118	56.2%	
	-1	25	23.8%	10	9.5%	35	16.7%	
	0, +1	2	1.9%	0	0%	2	0.95%	

contraction of smooth muscles of the uterus. Date fruit also has a laxative effect, which stimulates uterine contractions (12, 14).

In Qur'an, the holy book of Muslims, date fruit has been introduced as part of a healthy diet. As mentioned in Qur'an, God gave Mary fresh date fruit in the time of giving birth. According to Islamic Hadiths, if date fruit was not a rich food source, God would not have given it to Mary.

Date fruit contains 13 vital substances and 5 kinds of vitamins, fatty acids, and sugars. Thus, this fruit, which is rich in minerals, is recommended for pregnant women who need energizing and nutritious foods (18). Date fruit also influences estrogen and progesterone hormones, which are effective in preparing the uterus and cervical ripening (16).

The current research was not double-blinded, which is a limitation of this study. Also, the amount and duration of date fruit consumption were not recorded, which highlights the importance of performing further studies. Finally, another limitation was lack of control over the mothers' daily diet.

Conclusion

Cervical ripening was more favorable in women, who used date fruit, compared to the non-consuming group. Given that date fruit is an energizing and nourishing substance, its use is recommended for pregnant women during pregnancy, particularly during the final weeks of gestation.

Acknowledgment

This study was extracted from a research project, approved on 29/10/2012 by Mashhad University of Medical Sciences (code: 910732), and sponsored by the University Research Council. The authors appreciate the cooperation and assistance of the University Vice Chancellor for Research.

Conflict of Interest

The authors declare no conflicts of interest.

References

1. Cunningham FG, Leveno KJ, Bloom SL, Hauth JC, Rouse DJ, Spong CY. Williams obstetrics. 23rd ed. New York: McGraw-Hill; 2010.
2. Speroff L, Fritz MA. Clinical gynaecologic endocrinology and infertility. 5th ed. Philadelphia: Lippincott Williapms & Wilkins;2005.
3. Macones RRaGA. Prolonged and Postterm Pregnancy. Obstetrics Normal and Problem Pregnancies. NewYork: Churchill Livingston; 2012:770-771.
4. Asgari safdar A, Daghigh Kia H, Farhadi R. Physiology of parturition. International Journal of Advanced Biological and Biomedical Research. 2013; 1(3):214-221.
5. Esmaeelzadeh Sh, Vazirinejad R, Loripour M, Sarafrazi F. Effect of sexual relationship during the last four weeks of pregnancy on Bishop score. J of Semnan University of Medical Sciences. 2008; 10(1):49-53.
6. Kean LH, Baker Ph, Edelstone DI. Best practice in labor ward managment. First edition USA: W. B. Saunders Company; 2000.
7. Kelly AJ, Tan B. Intra venous oxytocin alone for cervical ripening and induction of labor. Birth. 2001; 28(4), 280-281.
8. Nicoll AE, Mackenzie F, Greer IA, Norman JE. Vagina application of the nitric oxide isosorbide mononitrate for preinduction cervical ripening. American Journal of Obstetrics and Gynecology. 2001; 184:958-964.
9. Score B. Methods for cervical ripening and induction of labor. Am Fam Physician. 2003; 67(10):2123-8.
10. Al-Kuran O, Al-Mehaisen L, Bawadi H, Beitawi S, Amarin Z. The effect of late pregnancy consumption of date fruit on labour and delivery. Journal of obstetrics and gynaecology. 2011; 31(1):29-31.
11. kordi M, salek N, safarian M, smaeili H. Effect of Dates syrup on the progress of labor in primiparous women during labor. Journal of Obstetrics, Gynecology and Infertility. 2009; 13 (2):23-30.[Persian]
12. Khadem N, Sharaphy A, Latifnejad R, Hammod N, Ibrahimzadeh S. Comparing the efficacy of dates and oxytocin in the management of postpartum hemorrhage. Shiraz E-Medical Journal. 2007; 8(2):64-71.
13. Vaezi S. Date is life tree. Tehran: Azineh Golmehr; 2004. [in persian]
14. Al-Shahib W, Marshall RJ. The fruit of the date palm: its possible use as the best food for the future? International Journal of Food Sciences and Nutrition. 2003; 54(4):247-259.
15. Baliga MS, Baliga BRV, Kandathil SM, Bhat HP, Vayalil PK. A review of the chemistry and pharmacology of the date fruits (Phoenix dactylifera L). Food Research International. 2011;44(7):1812-1822.

16. Moshtaghie A, johari H, Shariati M, Amiri c. Effects of Phoenix Dactylifera on serum concentration of estrogen, progesterone and gonadotropins in adult female rats. Journal of Rafsanjan University of Medical Sciences. 2009;9 (2):124-117.[persian].
17. Zangeneh F, Moezi L, Amir Zargar A. The effect of palm date, fig and olive fruits regimen on weight, pain threshold and memory in mice. Iranian Journal of Medicinal and Aromatic Plants. 2009; 25(2):149-158.
18. Makarem Shirazi N. [Tafsire nemooneh]. Ghom: Darolketabe Al-Eslamiyeh; 2008. pp: 59-61. [in Arabic–Parsian]
19. Iravani M, Montazeri S, Afshari P, Soori H. A satudy on the safty and efficacy of castor oil for crrvical ripening and labor induction. Scientific Medical Journal. 2007;5(1):400-404.
20. Simpson M, Parsons M, Greenwood J, Wade K. Raspberry leaf in pregnancy: its safety and efficacy in labor. J Midwifery Womens Health. 2001; 46(2):51-59.
21. Eisenberg DM, Davis RB, Ettner SL, Appel S, Wilkey S, Van Rompay M, et al. Trends in alternative medicine use in the United States, 1990-1997: results of a follow-up national survey. JAMA. 1998; 280:1569–1575.
22. Dove D, Johnson P. Oral Evening Primrose Oil: Its Effect on Length of Pregnancy and Selected Intrapartum Outcomes in Low-Risk Nulliparous Women. Journal of Nurse-Midwifery. 1999; 44(3): 320-324.
23. Gatward H, Simpson M, Woodhart L, Stainton MC. Women's experiences of being induced for post-date pregnancy. Women Birth. 2010; 23(1):3-9.