

Evaluation of the effect of castor oil on initiating labor in term pregnancy

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ABSTRACT

Objective: To determine the effect of castor oil on initiating labor in term pregnant women.

Methods: We conducted this randomized control clinical trial on 47 pregnant women from August 2003 to March 2004 in Mashhad University of Medical Sciences, Iran.

Results: There was a significant increase in labor initiation ratio in the castor oil group compared with the control group (54.2% compared with 4.3%, $p < 0.001$). Also, the

mean bishop score in the castor oil group increased from 2.50 ± 1.29 to 6.79 ± 3.20 ($p < 0.001$).

Conclusion: The probability of labor initiation increases during the first 24 hours after using castor oil, however, further studies are recommended to improve its efficacy and safety.

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Prolonged pregnancy has a main role in prenatal mortality, but its mechanism is not yet clear, and so there is no effective treatment for it.¹ Prolonged pregnancy means a pregnancy which has been continued for 42 complete weeks (294 days) or more from the first day of the last menstrual period (LMP).^{1,4} The incidence of prolonged pregnancy is approximately 4-14%.^{1,5} Two weeks or more after the expected date of delivery (EDD), pregnant women may be under psychotic pressure and had anxiety regarding delayed delivery, complications and physical trauma due to a macrosomic infant delivery.⁶ Postpartum hemorrhage and infection may also occur in these cases.⁷ In prolonged pregnancy, some risk factors may threaten the fetus life. Labor induction, cesarean delivery, macrosomia, and shoulder dystocia were also significantly increased.^{1,3,8} The logical solution to decrease these risks in a prolonged pregnancy is to end the pregnancy before these complications occur.¹

At present, there are different methods of induction (mechanical, surgical and pharmaceutical) to prevent prolonged pregnancy,^{4,9} but there is no safe method yet without any maternal and fetal complications. Although the effects of oxytocin in the induction of labor were demonstrated well, it has potential fetal and maternal risks.¹ On the other hand, oxytocin stimulation requires hospitalization and the attention of specially trained personnel. Pregnant women must be confined to bed for maternal and fetal monitoring.¹⁰

Due to the different side effects of chemical drugs, physicians now a days recommend herbal preparations.¹¹ Castor oil is a herbal preparation that has been used for induction of labor from ancient Egypt until now.¹² Its probable mechanism is to stimulate labor following the secretion of prostaglandins;^{10,13,14} it may also lead to reflex stimulation of the uterus, and stimulation of the intestinal peristalsis.^{10,12,14,15} Garry

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et al¹³ showed a significant increase in the initiation ratio in the castor oil group compared with the control group. Nabors¹⁵ in 1958 reported that although an empty bowel is desirable for labor and delivery, castor oil is of no value in the role of the induction of labor. According to a national survey of the American College of Nurses - Midwives (ACNM), 78% of the ACNMs recommends useful herbal preparations such as castor oil to stimulate labor, but despite widespread use of castor oil there are only a few studies regarding its safety and efficacy.^{13,16} The aim of this study was to investigate the effects of castor oil in the initiation of labor in term pregnant women.

Methods. This is a randomized clinical trial on all term pregnant women who was admitted to the maternity clinics of Emam-Reza Hospital and Pastor Maternity Hospital, Mashhad, Iran for prenatal care from August 6, 2003 to March 10, 2004. The inclusion criteria include permanent residence in Mashhad, age 19-35 years, gestational age of 40-42 weeks, singleton pregnancies with cephalic presentation, Bishop score of ≤ 4 , intact membranes, regular fetal heart rate, normal fetal movements or reactive nonstress test (NST), estimated fetal weight of 2.5-4 kg. The exclusion criteria were medical or obstetrical complications in the current pregnancy, appearance of regular uterine contractions, grand multiparity (6 or more), enema, pelvic exams, coitus and nipple stimulation, use of laxatives, herbal preparations or chemical drugs or traditional methods for induction in last 24 hours. We selected 50 pregnant cases that fits the inclusion criteria and randomly divided them into castor oil and control groups. One patient in the castor oil group and 2 cases in the control group were excluded during our study as we later discovered that they had one of the exclusion criteria, so our study was limited to 47 cases (24 patients in castor oil group and 23 cases in control group). To gather information we used forms based on interview, observation and physical examination; and we also used a form to record the fetal movements. We

prepared 60 cc of castor oil for each case in the castor oil group, which was used orally, and we recorded the time of administration. There was no intervention in the control group. We followed up both groups for 24 hours to detect labor initiation. The patients were told to restrain from coitus, enema, laxatives, herbal preparations and chemical drugs or traditional methods of induction of labor. We also gave them fetal movement recording forms. In both groups, follow up was carried out by filling out an appropriate form (for interview, observation, and physical exams) as a supplement to the admission sheet. The date and hour of entry to the study and phone number of the researchers were also recorded in these forms. The cases were to phone the researcher if they had at least 3 painful uterine contractions (abdominal rigidity) in 10 minutes, decreasing fetal movement, watery or bloody discharge or hemorrhage to get the necessary guides and come to the research centers if needed (to show the labor initiation by the researcher and record the date and hour of initiating labor in follow up form). The researcher also followed up the cases by regular phone calls. The patients were recommended to come to the research center 24 hours after the first pelvic exam, and record the results of the pelvic examination, as well as the monitored contraction in the form distributed earlier. At the end of our study, the form was completed by recording the weight and gender of the neonate.

The study data were evaluated using the Statical Package for Social Sciences for windows version 11.5. Chi-square, Fisher exact and independent t-test were used to examine relationship between nominal and quantitative variables as appropriate. All means are as mean \pm SD. The $p < 0.05$ were considered statistically significant.

Results. The results showed that there was no significant difference in the mean age, body mass index, gestational age, Bishop score in the onset of study, and the neonate weight between case and

Table 1 - Comparison of some variables between castor oil and control groups.

Group variable	Castor oil group (N=24)	Control group (N=23)	Total (N=47)	t	p
Maternal age (year)	25.04 \pm 4.44	23.87 \pm 4.34	24.47 \pm 4.38	0.915	0.365
BMI (kg/m ²)	24.05 \pm 0.877	23.99 \pm 0.603	24.02 \pm 0.748	0.284	0.778
Bishop score age (days)	282.04 \pm 2.99	282.17 \pm 1.99	282.11 \pm 2.52	0.178	0.860
Bishop score in the onset of study	2.50 \pm 1.29	2.39 \pm 1.08	2.45 \pm 1.18	0.314	0.755
Birth weight (grams)	3237.5 \pm 349.9	3395.6 \pm 261.1	3330.8 \pm 341.4	1.750	0.087

Data were presented as mean \pm standard deviation. BMI - body mass index.

control groups ($p>0.05$) (Table 1). The groups did not differ in parity according to chi-square test. In the castor oil group, 66.7% of the patients and 69.6% of the control groups were primipara. There was no significant difference between the 2 groups with regards to job, educational state, socioeconomic level, history use of non-steroidal anti-inflammatory drugs and regular exercise, a hot bath 24 hours before the time of study or during our study, use of peppery and no medicinal foods and hyperactivity during the study, history of prolonged pregnancy, and the neonate gender ($p>0.05$). The mean vital signs in the onset of study were the same in both groups according to independent T-test ($p>0.05$). There was a significant difference between the initiating labor rate in both groups using chi-square test (54.2% in the castor oil group versus 4.3% in the control group) ($p<0.001$) (Table 2). Also, the mean Bishop score in the castor oil group increased from 2.50 ± 1.29 (at the first) to 6.79 ± 3.20 (at the end) ($p<0.001$). The incidence of meconium-stained amniotic fluid (in artificial or spontaneous rupture of membrane) was 3 times more common in the control group (13%) than in the castor oil group (4.3%), but the difference was not significant according to the Fisher's exact test ($p>0.05$). Among all newborn neonates there was no significant difference in mean Apgar scores at one and 5 minutes ($p>0.05$) (Table 3). In the castor oil group, 79.2% of cases and 52.2% of the control group had normal vaginal delivery, so there was no significant

difference between delivery methods in both groups according to chi-square test ($p>0.05$). Furthermore, a significant difference between nausea rate in case and control groups was observed according to chi-square test (45.8% against 0%) ($p=0.000$), but vomiting rate was not significantly different in both groups according to Fisher's exact test ($p>0.05$). There was no hyper stimulation of uterus in the castor oil group. The mean contraction rate was 0-5 in the first 10 minutes after the end of study, and the mean contraction duration was 0-55 seconds.

Discussion. The results of this study show that the frequency of labor initiation in the castor oil user group was more than the control group. Garry et al¹³ also evaluated the effects of the use of castor oil in term pregnancies, and they also reported a higher incidence of labor initiation in castor oil users (57.7% in the castor oil group against 4.2% in the control group, $p<0.001$). This study confirms our results that there is a higher probability of labor initiation after the use of 60 cc castor oil. In a retrospective study on pregnant women with premature rupture of membrane (PROM), Davis¹⁰ reported a higher rate of labor initiation in castor oil users rather than the control group. The difference between these 2 groups was significant statistically (75% against 58%, $p<0.02$).¹⁰ Although the results are not very accurate as the study is retrospective, according to potential side effects of oxytocin, it seems logical to use castor oil in low-risk population with PROM. Mathie and Dawson¹⁷ also reported that castor oil increases uterine contractions [up to a mean increase of 186% compared with pre-intervention period) ($p<0.01$ and $p<0.02$). This study supported the thesis regarding the relation between intestinal prostaglandin (PG s) secretion in castor oil users and uterine contractions. Castor oil may initiate labor by PG secretion.^{10,13,14} Luderer et al¹⁸ demonstrated an increase in portal vein level of PG E₂ in rates after the use of castor oil. In a clinical trial on 114 high risk pregnant women, Nabors¹⁵ evaluated castor oil for the induction of labor as an adjunct for other methods such as rupture of membranes, enema

Table 2 - Frequency of labor initiation in castor oil and control groups.

Labor initiation	Group	
	Castor oil N (%)	Control N (%)
Yes	13 (54.2)	1 (4.3)
No	11 (45.8)	22 (95.7)
$X_2 = 13.937, p<0.001$		

Table 3 - Comparison of first and fifth minute Apgar score in castor oil and control groups

Variable	Group			Independent T-test
	Castor oil group (N=24)	Control group (N=23)	Total (N=47)	
First minute Apgar score	8.88 ± 0.338	8.87 ± 0.344	8.87 ± 0.337	$t=0.055, p=0.957$
Fifth minute Apgar score	9.29 ± 0.464	9.22 ± 0.422	9.26 ± 0.441	$t=0.573, p=0.569$
Data were presented as mean \pm standard deviation				

or Pitocin; but finally he concluded that Pitocin and rupture of membranes have the main role in initiating labor so the use of castor oil was not necessary. Results of Nabors¹⁵ study differ from our study, this may be due to the fact that Nabors¹⁵ studied preterm high risk pregnant women who did not have a favorite cervix for delivery and induction of labor in these cases was obligatory due to obstetrical indications such as hypertension, PROM and others. This is why the castor oil and control groups were not the same in cervical Bishop score, gestational age, induction factor and other variables. In our study, castor oil and control groups were almost similar in these variables. In agreement with our study, Garry et al¹³ also did not detect a significant difference between the incidence of meconium-stained amniotic fluid in castor oil and control group. Davis¹⁰ did not report any meconium-stained amniotic fluid in castor oil users. However, Mitri et al¹⁹ reported an increased rate of meconium-stained amniotic fluid after the use of castor oil, and the reason maybe due to fetus maturity. Incidence of meconium-stained amniotic fluid in term pregnancy is 7-22%, although only a meconial amniotic fluid does not indicate fetal distress.²⁰ Further studies are needed to evaluate the relation between meconial amniotic fluid and ingestion of castor oil. We did not see any uterine hyper stimulation in our study. We conclude that probability of labor initiation increased within 24 hours after using 60 cc of castor oil. However, we suggest more studies to evaluate the efficacy and safety of castor oil in a larger populations.

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