

Rectal versus Intramuscular Hyoscine: its Effects on Shortening the First Stage of Labor in Term Primigravid Women

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Abstract

Background

Spasmolytic drugs such as hyoscine have been proven to enhance cervical dilatation and accelerate the stages of labor. The aim of this study was to compare rectal and intramuscular hyoscine in shortening the first stage of labor in term primigravid women.

Materials and Methods: In this randomized clinical trial, 80 pregnant women were selected by convenience sampling. One group received two 10 mg rectal suppositories, whereas 2ml intramuscular (IM) hyoscine was administered for the other group, both at the onset of the active phase of labor. The two groups were compared in terms of labor stages, cervix dilatation rate, maternal blood and heart rate, Apgar score at birth and fetal heart rate. The collected data were analyzed using SPSS software (version 21.0).

Results: The mean age of women in the rectal and intramuscular hyoscine groups was 24.5 ± 3.2 and 24.65 ± 4.45 years, respectively. The duration of first and second stages of labor was not significantly different between the two groups ($P > 0.05$); whereas the third stage of labor in the rectal hyoscine group was significantly shorter than IM hyoscine group ($P = 0.001$). The mean 1st and 5th min Apgar scores and the fetal heart rate after drug administration were significantly different between the two groups ($P < 0.05$).

Conclusion

Hyoscine rectal suppository, which is faster absorbed and avoids gastric irritation, was significantly more effective in shortening the duration of labor in comparison to IM hyoscine, although the difference was only in the 3rd stage of labor. Therefore, it is recommended in all pregnancies for accelerating the process of labor.

Key Words: Hyoscine, First stage of labor, Primigravid, Term pregnancy.

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1- INTRODUCTION

Pain during human childbirth is ubiquitous and severe, and interference with childbirth pain has always been a matter of debate for doctors and patients (1). The last few gestational hours in humans are associated with uterine contractions that cause cervical dilatation and the transfer of the fetus to the delivery duct. As the pain of natural labor is the most grievous pain which man experiences, the active management of natural labor is considered both a science and an art. Accordingly, the shortening of the labor process from admission to delivery has been the goal of many studies. On the other hand, as one of the most important health concerns of all governments worldwide is the better care of the two highly vulnerable groups in each society, mothers and children; and as decreasing the labor pain and its duration is part of modern midwifery care, in this regard, the proper care of mothers during labor and finding a way to reduce the pain duration is one of the main issues of interest in many researches (2).

Today, various drugs are administered to accelerate the stages of labor by reinforcing uterine contractions and increasing cervical dilatation and effacement. Hyoscine N-butyl bromide (HBB, buscopan), is an example; it is an anti-cholinergic, antispasmodic drug and a non-selective muscarinic antagonist producing both peripheral antimuscarinic properties and central sedative, antiemetic, and amnesic effects (3-5). HBB has been proved to relieve pain in stomach and bowel cramps by inhibiting smooth muscle contractility (6). In a recent study, it was proved that hyoscine can be a good choice for reducing pain, tenderness, and rebound tenderness in patients with appendicitis (4). It also induces its sedative effects directly on the smooth muscles of the genitourinary tract along with a gradual and prolonged sedative effect on the brain,

causing forgetfulness to events. However, no apparent effect on the spontaneous contractions of the uterus has yet been reported (7). Due to its antispasmodic effects on smooth muscles, hyoscine is commonly used in visceral spasm disorders such as bronchial spasm, ureteral and bladder spasm, GI spasm and renal colic (2, 8, 9). As HBB is considered a relatively safe drug with few side effects (4), it is the most common drug used for labor pain since 1960; this drug does not eliminate pain, but its memory fades; this can also be attributed to reduced anxiety levels leading to shortened labor (8). Furthermore, spasmolytic drugs are believed to be effective in improving cervical spasm and accelerating cervical dilatation during labor. They seem to accelerate the active phase of labor and shorten the pain duration (10).

The mechanism by which HBB acts in the context of labor has not yet been elucidated, but some researchers have mentioned its direct effect on smooth muscles of the cervix and increasing effacement as the possible mechanism; whereas others have only reported increased cervical dilatation velocity with this drug (11, 12). Nevertheless, HBB can penetrate through the placenta and intravenous (IV) injection during pregnancy especially close to delivery time can cause fetal tachycardia (13). Decreased beat-to-beat variability and fetal tachycardia are the potential adverse effects of HBB (10).

As the primary usage of this drug for treating labor pain is non-specific, and as the rectal administration of the drug is more convenient, it is absorbed faster, does not cause gastric irritation and hepatic metabolism is partially bypassed (14); in this study we aimed at comparing the effect of rectal hyoscine and intramuscular hyoscine on shortening the first stage of labor in primigravid mothers with term pregnancy along with its effect on neonatal

Apgar scores and pulse rate and also maternal blood pressure and heart rate.

2- MATERIALS AND METHODS

2-1. Study design and population

In this, interventional randomized clinical trial women who were a candidate for normal vaginal delivery (NVD), and visited the antenatal clinic complaining of pain were recruited. Based on Sheded et al.'s study (8), and considering a confidence interval of 99% and a test power of 90%, the sample size was calculated as 18 cases per group. With regards to the probable fall outs, 40 cases were selected for each group with the convenience sampling method.

2-2. Inclusion and exclusion criteria

The inclusion criteria were as follows: primigravid women aged over 17 years with a singleton fetus with a cephalic presentation at a gestational age of 37-42 weeks, and in the beginning of spontaneous labor, either intact membranes or spontaneous rupture of membranes for less than 12 hours, and no history of an underlying or pregnancy-related disease which is a contraindication for NVD. All cases with abnormal fetus presentation, previous uterine scars, prolonged rupture of membranes (>12hrs), twin or multiple pregnancy, presence of underlying diseases such as maternal diabetes and hypertension, augmentation of labor using oxytocin or the need for instrumental delivery were excluded from the study.

2-3. Method

At presentation and the onset of the active labor phase, the initial dilatation and effacement of the cervix in each participant was determined through vaginal examination. Those with true and regular contractions each 2-3 min along with 3-4 cm dilatation were assigned into two groups based the table of random

numbers. The drug was administered at the onset of the active phase. Two 10 mg hyoscine suppositories were prescribed for the first group and 40 mg (2cc) intramuscular hyoscine was administered for the second group. In addition, 50mg intramuscular pethedine injection (as an opium analgesic) was applied for both groups simultaneously. The cervix was re-examined 1 and 2 hours after drug administration and the timing of full dilatation (interval between 3-4cm dilatation to full dilatation), 2nd stage of labor (full dilatation to child birth), and the 3rd stage of labor (child birth to placental delivery) was recorded. No other type of intervention such as amniotomy was done nor was any other drug administered during labor. The maternal blood pressure and pulse rate, fetal heart rate and 1st and 5th minute neonatal Apgar scores were measured as secondary study outcomes.

2-4. Ethical consideration

The Ethics Committee of Mashhad Islamic Azad University approved the study protocol. It was fully described to each subject and a written informed consent was obtained from each participant and her partner prior to study entrance. They were ensured that all data will be regarded as confidential and they are free to leave the study at any stage.

2-5. Data Analyses

The SPSS software (version 21.0) analyzed the collected data. Chi-square test was used for qualitative data analysis; quantitative data with a normal distribution were examined by t-test whereas Mann-Whitney test or Kruskal-Wallis test was used for abnormally distributed data. The significance level was set at $P < 0.05$.

3- RESULTS

In total 80 cases were studied. The mean age of mothers in the rectal and intramuscular hyoscine groups was 24.05 ± 3.2 and 24.65 ± 4.45 years,

respectively indicating no meaningful difference ($P=0.491$). The mother's age ranged from 17 to 32 years and the most prevalent age group was 2-24 (41.3%), and 35-29 (38.8%) years. The mother's mean weight was 67.61 ± 11.56 and 75.92 ± 10.76 kg, respectively, being significantly more in the IM hyoscine group ($P=0.002$). The most prevalent mothers' weight group was 61 to 80 kg (60%), and none of the mothers weighed over 100 kg. The most prevalent gestational age was 39 weeks (40%) in the rectal hyoscine and 40 weeks (37.5%) in the IM hyoscine group. The other studied characteristics of the mother and fetus are presented in **Table.1**.

In the rectal hyoscine group neither the mother's weight nor the gestational age had a significant association with cervix dilatation 1 and 2 hours after drug administration ($P>0.05$). Accordingly, mean cervical dilatation after 1 and 2 hours of drug administration showed no significant difference between the two studied groups ($P=0.148$, $P=0.965$, respectively). Despite being shorter in the rectal hyoscine group, no meaningful difference was observed in the duration of stage 1 and 2 of labor between the two groups ($P=0.08$, $P=0.19$). However, stage 3 was significantly shorter in the rectal

hyoscine group ($P=0.001$, **Table.1**). The amniotic sac was ruptured in 5 (16%) and 19 (47.5%) cases in the rectal and IM hyoscine groups before study entrance, indicating a significant difference ($P=0.002$). Despite the duration of amniotic sac rupture being 9.85 min less in the rectal hyoscine group prior to study entrance, the time difference was not statistically significant ($P=0.828$, **Table.1**). Neonatal Apgar scores were determined 1 and 5 minutes after birth; the scores were 9 and 10 in the rectal hyoscine group, respectively. The same figures were 8.77 ± 0.53 and 9.80 ± 0.82 in the IM hyoscine group. Both scores showed a significant difference between the two groups ($P=0.006$, $P=0.041$, respectively).

Regarding maternal blood pressure and pulse rate before and after drug administration, no meaningful difference was observed between the two groups; however, a statistically significant difference was achieved in the fetal pulse rate both before and after drug administration between the two groups ($P=0.001$ and $P=0.004$, respectively; **Table.2**). The administered drugs were well tolerated by all patients and no adverse effect was noted.

Table-1: Comparison of mother and fetal characteristics before and after drug administration between the studied groups.

Variables	Rectal hyoscine, n=40	IM hyoscine, n=40	P-value
Mean gestational age (week)	38.42±1.91	39.02±1.12	0.155
Mean fetal weight (gr)	3167.25±290.32	3219.25±330.43	0.457
Mean dilatation before drug administration (cm)	4.03±1.58	4.00±0.00	0.317
Mean dilatation 1hr after drug administration (cm)	5.5±0.99	5.82±0.93	0.148
Mean dilatation 2hr after drug administration (cm)	7.32±1.65	7.30±1.52	0.965
Mean stage 1 duration (min)	242.83±105.55	386.37±109.37	0.08
Mean stage 2 duration (min)	42.37±18.98	48.12±19.63	0.19
Mean stage 3 duration (min)	7.45±3.05	12.65±8.32	0.001
Mean amniotic sac rupture duration before study entrance (min)	163.33±132.31	173.18±106.25	0.828

Table-2: Comparing maternal blood pressure and maternal and fetal pulse rate between the two groups before and after drug administration.

Variables	Rectal hyoscine	IM hyoscine	P-value
Mean systolic BP before drug administration	10.53±0.78	10.92±1.15	0.079
Mean systolic BP after drug administration	10.54±0.75	10.94±1.00	0.064
Mean diastolic BP before drug administration	7.10±0.60	6.92±1.03	0.636
Mean diastolic BP after drug administration	7.10±0.50	6.97±0.98	0.546
Mean maternal PR before drug administration	79.92±5.45	79.1±4.76	0.629
Mean maternal PR after drug administration	80.07±5.53	80.92±4.60	0.145
Mean fetal HR before drug administration	137.5±3.75	141.65±6.00	0.001
Mean fetal HR after drug administration	137.65±3.47	141.42±7.28	0.004

IM: Intramuscular; PR: Pulse rate; HR: Heart rate.

4- DISCUSSION

Prolonged labor can lead to increased maternal and neonatal mortality and morbidity due to the higher risk of maternal exhaustion, postpartum bleeding and sepsis, fetal distress and asphyxia (15). With the active management of labor, the number of cesarean deliveries reduces and the duration of labor shortens (16). Hyoscine (IM or IV injection) is one of the drugs used for this purpose, to shorten labor and to overcome an edematous cervix (10). In this study, we compared IM and rectal hyoscine in shortening the 1st stage of labor in term primigravid women. Despite a decrease in the duration of the 1st and 2nd stages of labor, our findings revealed a significant time reduction only in the 3rd stage of labor for the rectal hyoscine group. In the study by Shedid et al. (8) in Egypt on 150 primipara women, rectal paracetamol was compared with a combined suppository of paracetamol and 10 mg hyoscine. In this study both the 1st and 2nd stages of labor were significantly shortened in the combined suppository group. Moreover, the need for oxytocin augmentation and instrumental delivery was significantly lower in this group.

Similar results were reported by Makvandi et al. who compared the effect of 20 mg rectal hyoscine and placebo on 130 primigravid women (14). In the study by Aziz in 2014, 20 mg rectal hyoscine also resulted in significantly shortened active phase of labor in 200 primi- and multigravida women when compared with the placebo group (n=200) (17). Gahtani et al. in 2012 compared 40 mg IM hyoscine and placebo on 97 term primiparous women and reported a significant decrease only in the 1st stage of labor as a mean shortening of 23.3% (10). In a recent study by Kandil et al. on 110 primigravid term pregnant women, 40mg IM HBB resulted in a significant shortening in stage 1 compared to placebo (18). Despite the present study showing a reduction in the duration of 3rd stage of labor, it seems that most studies administering rectal and IM hyoscine have observed shortening only in the 1st and 2nd stages of labor. In addition to the difference in the mothers' age and ethnicity, this could also be related to the different dosage of HBB applied or the phase in which the drug was administered. In the study by Aggarwal et al. on 104 primipara women, 40 mg IV hyoscine also

resulted in a significant decrease in the active phase of labor and pain relief compared to placebo (19); similar to the study by Maged et al. (20). Samuels et al. (21), and Kirim et al. (16) also demonstrated a significant reduction in the 1st stage of labor with 20 IV hyoscine in primigravid and multigravida women. All these studies further prove the role of hyoscine in shortening the labor process and the level of pain experienced by the mother. Regarding studies exclusively performed on multigravida women comparing IV hyoscine with placebo, Imaralu et al. (22) in Taiwan reported a significant shortening in the 1st stage of labor, whereas Sekhavat et al. (23) reported a significant decrease in the duration of the 1st and 2nd stages. Nevertheless, a significant time reduction in all three stages of labor was observed in Alani et al.'s study from Iraq with 40mg IV injection of hyoscine (24).

In the study by Makvandi et al. comparing 20 mg hyoscine suppository with placebo on cervical dilatation in 130 term primigravid women in the active phase of labor, a significant difference in mean cervical dilatation and effacement was observed between the two groups 1 and 2 hours after the intervention (14). This was in contrast to our results indicating no difference in cervical dilatation after 1 and 2 hours of drug administration between the two studied groups ($P=0.148$, $P=0.965$, respectively). In the present study both the mean 1st and 5th minute neonatal Apgar scores were significantly higher in the rectal hyoscine group compared to the IM hyoscine group ($P=0.006$, $P=0.041$, respectively). This difference could be due to the route of drug consumption as the rectal form has faster absorption with a relative bioavailability of 30%, whereas IM hyoscine has a 1-hour absorption delay and a bioavailability of 50%. Moreover, most of the spasmolytic effects can be due to the localized effect of the rectal form on

the cervix. This is in contrast to Shedid et al. (8), and Sekhavat et al.'s studies (23) reporting no meaningful difference in the Apgar scores between the two groups of combined suppository and paracetamol and Qahtani et al.'s study (10) in which the amount of bleeding and Apgar scores did not differ between the two groups. In general, no change in the Apgar score was reported by any of the mentioned studies when comparing either, rectal, IM or IV hyoscine with placebo. The difference between the latter studies and ours can be related to the difference in the perineal length and pelvic size, less exercise in women before and during pregnancy and the cultural diversities in accepting normal vaginal labor in our community which can all result in prolonged labor; also, the different study populations may have affected the difference in the reported results.

In the present study, no meaningful difference was observed in the maternal blood pressure and pulse rate before and after drug administration between the two groups; yet a statistically significant difference was achieved in the fetal pulse rate both before and after drug administration between the two groups ($P=0.001$ and $P=0.004$). In the study by Makvandi et al. (14) in 2010 comparing 20mg hyoscine suppository and placebo, the rate of cesarean section was less in the study group, however, no difference was reported in the severity of labor pain, mean fetal heart rate, maternal blood pressure and pulse rate between the two groups. The primary strength of this study, in addition to being a randomized double blind controlled trial, is that only primigravid patients in spontaneous labor were enrolled with the exclusion of patients receiving oxytocin and requiring instrumental delivery. However, this study had certain limitations; the sample size was small and we did not follow-up the mother and fetus for possible side effects

after childbirth. Also, postpartum blood loss was not studied in the two groups. Therefore, large, rigorous randomized controlled trials with longer follow-ups are highly recommended in this respect.

5- CONCLUSION

This study showed that HBB rectal suppository, which is faster absorbed and avoids gastric irritation, is significantly more effective in shortening the duration of labor in comparison to IM hyoscine, although their difference was only in the 3rd stage of labor. Further long term evaluations will be necessary to fully evaluate the scope of benefits that this reduction may confer. Furthermore, a significant difference was observed in the mean 1st and 5th minute Apgar scores and the neonatal heart rate, in favor of rectal HBB. Taken together, the rectal suppository form, because of its convenience of administration can be recommended in all pregnancies for accelerating the process of labor.

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7- CONFLICT OF INTEREST: None.

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