Factors Affecting the Labor: A Review Article

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ABSTRACT

The aim of this review is to describe pharmacological and non-pharmacological factors that have an effect on duration of the labor. Approximately all published articles from 1980–2013 in Medline and Embase were searched amongst them 118 articles were selected. The eligible studies were those that reported the labor length, labor duration and active labor. Studies including preterm, premature and labor induction were excluded and finally fifty-six articles were reviewed. Oxytocin, propranolol, Pethidine, Epidural analgesia, Nitrous Oxide and Intravenous Hydration are common pharmacological methods affecting the labor duration. Massage, Birth ball, Acupressure, Oral carbohydrate intake, Presence of companionship, Water birth delivery and Parturient position are considered as the main effective non-pharmacological methods on labor duration. Implementation of non-pharmacological methods, as effective factors on labor duration, is recommended.

Key words: Labor duration, Non-pharmacological factors, Pharmacological factors.

INTRODUCTION

Factors influencing maternal and neonatal outcome of pregnancy have been considered by researchers. The length of active phase of labor has been significantly longer while the second stage has been shorter in the past 20 years. Duration of labor varies widely depending on demographic, clinical, genetic factors, uterine activity, fetal lie or presentation and number of fetus. The active labor is slower in parturient who are homozygous for “G” at oxytocin receptor gene rs53576 transitioned. About 30% of all births choose the cesarean delivery due to the failure of labor progress or dystocia. Due to side effects of prolonged labor, there are multiple ways to reduce the labor duration. This approach is divided into two groups; the pharmacologic and non-pharmacologic methods. The aim of this review is to analyze the pharmacological and non-pharmacological factors effecting the duration of the labor.

METHODS

At the first stage, both Medline and Embase database were systematically searched during 1980 until now by which 118 citations were selected. At the next stage, a checklist including some information about study objectives, sampling methods, type of study and main findings were extracted from the abstracts resulting in excluding of ineligible papers. The eligible studies were those that have reported the labor length, labor duration, active phase, active labor, and effective factors on labor duration, labor dystocia, labor augmentation, delivery, childbirth duration and reduction the cesarean sections. Active labor, as a main key word, defined as onset of clinical criteria usually dilatation between 3–5 cm in the presence of uterus contractions. However, studies including preterm labor, premature labor and labor induction were excluded.
Out of 122 abstracts, 92 (75%) papers were categorized as potentially eligible for this systematic review. The qualitative assessment of the articles was conducted using research criteria. Finally at the last stage 56 (46%) full text articles were used for the current review (Figure 1).

RESULTS

We divided factors affecting the labor duration into two groups; Pharmacological and Non-pharmacological methods.

Pharmacological methods

Oxytocin

Labor dystocia due to reduce uterine contractions is one of the main causes leading to cesarean section\(^6\),\(^7\). In such conditions often oxytocin infusion is used for augmentation of the uterus contractions\(^8\)-\(^10\). Administration of Oxytocin to strengthen the uterus contractions and reducing the labor duration is rising widely\(^11\). Despite the benefits of oxytocin, this method is not without complications\(^12\)-\(^15\).

Propranolol

Some researchers who have evaluated the effect of oral propranolol on duration of labor have reported that the duration of active phase and second stage of labor have significantly been shorter in propranolol group than the control group. Cesarean section rate was significantly lower in the propranolol group without maternal and neonatal side effects\(^16\). The first uncontrolled study on the use of propranolol in dysfunctional labor that was done about four decades ago, reported some promising results\(^17\). Sanchez-Ramos et al compared the effect of oxytocin plus intravenous propranolol infusion with oxytocin plus placebo in abnormal active phase of labor. The frequency of cesarean delivery was lower in propranolol compared with the placebo group\(^18\). In other study, 57 multiparous parturient in active phase were randomly assigned into two groups. The frequency of cesarean section due to labor dystocia was 2 times in control group compared to the propranolol group (13.6%, 6.25 respectively). The neonatal and maternal outcome were similar in both groups\(^19\). However, in other study, women who received propranolol for labor induction\(^20\) or labor augmentation did not show any decrease in the frequency of cesarean delivery\(^21\).

Pethidine (Meperidine)

Pethidine, Meptazinol and Piritramide are the most common opiodes used in parturient during labor in Germany\(^22\). Pethidine or Meperidine hydrochloride is the first synthetic opioid synthesized in 1932. Intramuscular Pethidine analgesia during the first stage of labor hasn’t significance side effect\(^23\). Pethidine and Tramadol have similar effect on labor duration. Pethidine is a better choice than Tramadol in obstetric analgesia\(^24\). Pethidine can shorten the duration of active labor in Nulliparous women with normal pregnancy and term gestational age\(^25\). In contrast, other study reported that the use of Pethidine caused the slower labor\(^26\). A randomized clinical trial indicated that both Meperidine and control groups have an equal duration of labor. The pH of the umbilical cord arterial was lower in the Meperidine group compared with the control group; although the difference was not statistically significant\(^27\).

Epidural analgesia

Epidural regional analgesia is introduced as the gold standard for obstetric analgesia. It has high value and less central nervous system depression\(^28\). In a prospective study that investigated the effect of epidural analgesia on the duration of labor and the delivery outcome, all parturient were divided into two groups: epidural analgesia and control group. Epidural analgesia group had longer duration of first and second stage of labor than the control group. The frequency of oxytocin augmentation, emergency cesarean section, instrumental delivery, meconial amniotic fluid and low Apgar scores were similar in two groups\(^28\). In another prospective study that compared the effect of combined spinal epidural (CSE), epidural (E) and IV Pethidine analgesia on the labor progresses overall, sixty parturient in active labor were allocated to five subgroups. The used of epidural increased the duration of first stage of labor compared with the CSE and IV Pethidine groups\(^29\). The used of epidural analgesia led to prolonged duration of labor and increased Oxytocin requirements\(^30\).

Nitrous oxide

A study evaluated the effect of the inhalation of nitrous oxide premixed with oxygen
in labor. Overall two hundred pregnant women allocated in tow groups. The first group received nitrous oxide premixed with oxygen as control group and the second group received oxygen only. Based the results the used of inhalation of nitrous oxide premixed with oxygen (50%:50%) is a safe, effective and easy method in parturient. The use of 50% nitrous oxide during labor decrease duration of active phase compare with control group. Several studies confirmed the efficacy and safety of nitrous oxide for labor.

Intravenous hydration
The effect of increased intravenous hydration on labor duration is widely investigated. Previous study reported that hydrated women had shorter labor duration than insufficiently hydrated. Sufficient hydration had not any significant effects on the neonatal outcomes. However, in a recent study, intravenous hydration did not decrease labor duration. In a study, the mean duration of labor and the incidence of prolonged labor were not statistically significant reduction in patients receiving intravenous hydration.

Non Pharmacological methods
Massage
Delivery maybe is one of the most painful events that women experience during their lives. Parturient women have a high level of stressful pain that may negatively affect both mothers and neonates. The analgesics have previously been used for parturient women. Nowadays, the limitations and critical side effects of analgesics are well-known. Therefore, non-pharmacologic methods such as massage and music therapies are being broadly recommended. The increase of Katecolamins caused pain and anxiety, which induced the prolonged labor. Hence, the used of the methods of pain relieving can reduced the rate of prolonged labor.

Birth ball
Since 1987 birth ball has been used to improve the process of labor. Application of birth ball causes turning of fetus head in the mother’s pelvis thereby; duration of labor will be shorter. The safety of birth ball has been proven. In a randomized controlled trial study, 60 Primiparous women aged 18 to 35 years were assigned into birth ball and control groups. There were no significant differences between duration of the active phase and the interval uterine contractions between groups. In a randomized controlled trial, 188 women were allocated into two groups including intervention and control groups. The intervention group trained for at least 20 minutes three times a week for an episode of 6–8 weeks. Women in intervention group received a birth ball for use during labor. They encouraged every hour to select the suitable positions, movements, and activity. Both groups received standard care from hospital staff nurses in every way of pregnancy and delivery. The results shown that applied of the birth ball exercise program could be considered as an impressive tool to improve childbirth and delivery.

Acupressure
Acupressure and Acupuncture have varied use in gynecology and midwifery. Acupressure is impressive intervention on reduction of the cesarean section. The use of acupressure during labor has been recommended as an effective factor. In a study evaluate the effects of SP6 acupressure on labor duration among seventy-five parturient, SP6 acupressure group had shorter total labor duration compared with control group. LI4 acupressure at the beginning of the active phase, is effective on reduction of labor duration without adverse maternal and neonatal effects. However, another study reported that the use of Acupuncture did not influence the duration of labor. Both Apgar score at 5 minutes and umbilical cord pH were significantly higher among infants in the Acupuncture group compared with infants in the other group.

Oral carbohydrate intake
Insufficient uterine contractions is influenced by physical factors such as need of energy, eat and drink during labor. The energy requirements of the active phase of labor estimated 50 to 100 calories per hour and it is comparable with moderate energy requirements in aerobic exercise. The uterine muscle contractions have requires a constant energy. Since the early 1940s, the policy limits drinking during labor has started to run wide without any evidence of a beneficial effect on improving maternal and neonatal outcome. Proponents believe that eating and drinking restrictions reduce the mother’s risk of aspiration during general anesthesia. However, recent studies have shown that this policy
hasn’t guaranteed lower volume of gastric contents in patients with general anesthesia\textsuperscript{5, 57}. As well as, the self-regulated intake of drink and food during labor can help reduce stress and create a feeling of control\textsuperscript{7}.

**Presence of companionship**

In 1985, the World Health Organization (WHO) announced a voluntary choice of companionship to ensure the safety and satisfaction of mothers. A study has been supported this theory\textsuperscript{58}. Presence of companionship may improve uterus contractions and uterus blood flow by reduction of mothers’ anxiety. However, usually the mother’s emotional needs forgotten in labor due to much attention of mothers physical needs\textsuperscript{59}. Studies have shown that use of Doula or trained companionship can reduce the duration of labor\textsuperscript{60, 61}.

**Water birth delivery**

Today, many countries are using a non-invasive and non-pharmacologic method named water birth delivery. Using this method increases the pain threshold and cause uterine contractions become effective. Delivery process in the water, is much more tolerable without medical intervention\textsuperscript{42}. A 9-year prospective study compared overall 9518 women allocated in two groups. The first group included 3617 women in water birth delivery and the second group 5901 women in routine methods delivery. Based on the results, the water delivery was better and more useful for mother and newborn in comparing with the routine methods of delivery\textsuperscript{11}. Furthermore, water birth delivery can reduce the first stage of labor\textsuperscript{62}. It is a very good option for parturient women\textsuperscript{63}. Water birth delivery is useful in labor dystocia and prolonged labor. It also reduces the need of medical intervention\textsuperscript{14}. In a study seventy women in water birth method were compared with seventy women in routine methods delivery. The duration of the active phase of labor was same in both groups. However, the duration of the second stage of labor was nine minutes longer in women who have deliveries in water which can be attributed to the hydro analgesic effect of water. It partially inhibits uterine contractions in labor, but does not have any interactions with the delivery process\textsuperscript{15}.

**Parturient position**

Molina et al showed increasing the frequency and intensity of uterus contractions with standing position\textsuperscript{64}. In a randomized trial evaluated the effect of different positions in labor duration among 1000 parturient. Based on the results the walking in labor has not adverse effect or exacerbated the labor progress\textsuperscript{65}. Storton et al believed that walking in the labor is not harmful for women\textsuperscript{66} and had lower abnormal fetal heart rate pattern\textsuperscript{67}.

**CONCLUSIONS**

There are many pharmacological and non-pharmacological factors affect of labor duration. Oxytocin, Propranolol, Pethidine, epidural analgesia, nitrous oxide and intravenous hydration are main pharmacological factors affect of labor duration. Non-pharmacological factors affect of labor duration are including: Massage, birth ball, acupressure, oral carbohydrate intake, presence of companionship, water birth delivery and parturient position. Adverse neonatal and maternal outcomes haven’t reported by using the non-pharmacological methods, therefore, these methods are recommended for reduce of labor duration in parturient.

**REFERENCES**


13. Hawkins JM, Nambu M, Loren S. Asymmetric Lewis acid-catalyzed Diels-Alder reactions of alpha, beta-unsaturated ketones and


