

# Comparison of Two Doses of Oxytocin Regimes to Prevent Post-Caesarean Bleeding Due to Uterine Atony in Pregnant Women Referring to Amir-al Momenin Hospital of Zabol in 2016

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## Abstract

**Background and Objective:** Postpartum hemorrhage (PPH) is one of the most frequent causes of maternal morbidity and mortality, particularly after cesarean section. Oxytocin is a very helpful medication in this regard; however, its optimal dose and route of administration is still under debate. This study aimed to compare the effect of different doses of oxytocin in preventing PPH due to atony. **Methods and Materials:** In this randomized clinical trial, a total of 400 pregnant candidates for cesarean section were randomly received either 20 IU or 60 IU oxytocin diluted in 500 mL of serum. Pre- and post-cesarean levels of serum hemoglobin, hematocrit, and blood pressure, as well as post-cesarean need of extra medication, incidence of atony and blood transfusion requirement were compared between the two groups. **Results:** Decrease in serum hemoglobin, hematocrit, systolic blood pressure and diastolic blood pressure, as well as increase in pulse rate after cesarean section was significantly more dramatic in those received lower dose of oxytocin. The need of extra medication, atony and blood transfusion requirement were observed in 18%, 5.5%, and 3.5% of those treated with low dose oxytocin. There were absent in patients treated with high-dose oxytocin ( $p < 0.05$ ). **Discussion and Conclusion:** Compared to low-dose oxytocin, high-dose oxytocin is more effective in preventing atony and post-cesarean bleeding with no major side-effects.

**Keywords:** Oxytocin; Cesarean section; Post-partum hemorrhage; Atony

## Introduction

Postpartum hemorrhage is one of the most common causes of serious pathogenesis in mothers, cardiac arrest, and death during the hospitalization for labor especially in developing countries.

[1] The prevalence of this status has been reported to be 2-4% for a natural childbirth and 3-15% for a caesarean delivery. [2] Uterine atony is behind 75-90% of these bleedings, and if appropriate measures are not taken towards its treatment, the likelihood of maternal mortality will increase. [3] After the placenta delivery, the fundus of the uterus must be always touched to make sure that the uterus is contracted enough. If the uterus is not tense, giving a massage is necessary. In most cases intravenous injection of 20 units of oxytocin in 1000 ml of Ringer's lactate solution or normal saline with the speed 10 ml per minute as well as effective massage will work for the uterine contraction. Oxytocin should not be prescribed as a non-diluted dose, for it may cause severe hypotension or Cardiac arrhythmia. Oxytocin is the only drug that is both preventive and does not have any serious complications. It will only result in some complications if it is taken bolus. [4] If the oxytocin is not quickly infused, 0.2 mg of methylergonovine is injected either intramuscularly or intravenously. This drug is likely to stimulate uterine contraction to control bleeding. Methylergonovine will increase blood pressure, and it is forbidden for individuals suffering from high blood pressure. [5] Prostaglandin F2 alpha with the

initial intramuscular dose of 250 microgram is another drug that can be effective as well. If needed, this drug can be reused every 15-90 minutes up to 8 times. The limitations of this drug include its high price, inaccessibility, and its ban for individuals suffering from asthma or high blood pressure. The first measure in preventing or treating atony is prescribing uterus contractility drugs; the most important mechanism in placental hemostasis is vascular stenosis due to myometrial contraction. Oxytocin, methylergonovine, prostaglandin, and misoprostol are included as the contractility drugs that are applied for atony treatment. Since uterine atony is one of the common complications of delivery and as decreased uterine atony can reduce maternal bleeding and mortality, the present study was conducted due to the low sample size of the similar previous studies.

## Methods

The present study is a double-blind randomized clinical trial.

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**How to Cite this Article:** keikhaie KR, et al. Comparison of Two Doses of Oxytocin Regimes to Prevent Post-Caesarean Bleeding Due to Uterine Atony in Pregnant Women Referring to Amir-al Momenin Hospital of Zabol in 2016. *Ann Med Health Sci Res.* 2017; 7: 405-407

**Table 1: Changes in quantitative parameters a short while before and after cesarean were compared in two groups of low dose and high dose oxytocin receptors.**

Parameters	Dose of oxytocin	Average before cesarean	Average after cesarean	Mean difference (Standard deviation) before and after operation	P-value between the two groups
<0/001	-0/30(0/33)	11/23	12/01	Low	Serum of hemoglobin(mg/dl)
	-0/78(1/07)	11/41	11/71	High	
<0/001	-02/40(2/26)	35/36	37/76	Low	Hematocrit (%)
	0/01(1/06)	37/05	37/04	High	
<0/001	-6/64(11/13)	100/80	112/57	Low	Systolic blood pressure(mmHg)
	011/77(9/57)	102/23	108/68	High	
<0/001	-5/20(8/72)	61/02	70/48	Low	Diastolic blood pressure(mmHg)
	-9/46(9)	62/80	68/00	High	
<0/001	3/69(4/35)	92/29	82/78	Low	Heartbeats
	9/59(8/04)	85/78	82/09	High	

The statistical population of the present study includes all the pregnant women hospitalized for caesarean delivery during 10 months after the approval of the project. These women were candidates for receiving prophylactic oxytocin for the prevention of uterine atony or post-caesarean bleeding. The exclusion criteria of the present study were history of bleeding in the third trimester of pregnancy, high blood pressure, multiple pregnancies, macrosomia, having a hard delivery before the caesarean delivery, systolic blood pressure at admission of lower than 100, and below 3 parity. After the random division of the patients, the information was collected through examination, blood test, medical history, and referring to medical files by the doctor. In one group, oxytocin 20 IU was prescribed in 500 ml serum, and for the second group, oxytocin 60 IU was prescribed in 500 ml serum. At the end, the pre-caesarean and post-caesarean variables were compared in the two groups. The quantitative data were indicated as standard deviation,  $\pm$  mean (maximum-minimum). The qualitative data were shown using frequency (%). SPSS 16 was used for statistical analysis. For comparing quantitative data of the two groups, independent samples t-test was used, and for comparing the qualitative data, either chi-square test or Fisher's exact (depending on conditions) test was used. The statistical significance level of the present study was considered to be less than 0.05.

## Findings

The mean changes in quantitative parameters a short while before and after cesarean were compared in two groups of low dose and high dose oxytocin receptors are summarized in Table 1, and the two groups were compared in this way.

Based on this and given the findings of independent samples t-test, medium drop of serum hemoglobin, hematocrit, and systolic and diastolic blood pressure of post caesarean were significantly higher in the group receiving a low dose of oxytocin in comparison to the pre-caesarean values. Moreover, post-caesarean increase of average heartbeat rate was significantly higher than the pre-caesarean average heart beat in the group receiving a low dose of oxytocin (in all cases  $p < 0.001$ ). The comparison of qualitative variables (post-caesarean) of the two groups indicated that in the group receiving a low dose of oxytocin there was a need for the prescription of additional drug, atony, and blood transfusion after caesarean in 36, 11, and 7 cases respectively. None of these cases was observed in the group receiving a high dose of oxytocin.

## Discussion

In comparison to placebo, prophylactic oxytocin of whatever dose can reduce postpartum hemorrhage and decrease the need for prescribing Uterus tonics as well. Moreover, in comparison to other drugs commonly used in these cases, the complications arising from oxytocin is fewer and less risky. However, there are still some disagreements over the ideal dose and the best prescription method of oxytocin.<sup>[6]</sup> In a study conducted by Leduc et al., intramuscular oxytocin 10 IU or oxytocin 20-40 IU in 1000 ml of serum, with the speed of 150 ml per minute, was suggested as the ideal dose for preventing post-natural childbirth bleeding in women with low risk.<sup>[7]</sup> In a systematic review article, Stephens and Bruessel studied the optimal dose of oxytocin in caesarean section. In the aforementioned study, the high dose was considered to be 10 IU and the low dose as 5 IU. At the end, it was concluded that both doses were equally effective in preventing post-caesarean bleeding. However, the complications of the high dose turned out to be more than those of the low dose.<sup>[8]</sup> As it was observed and confirmed earlier, there are still some disagreements over the ideal dose and even the best prescription method of oxytocin for preventing post-delivery/post-caesarean bleeding. There are various reasons that result in different findings in different studies. One of these reasons is the purpose behind prescribing oxytocin. While in some studies, the main purpose was preventing uterine atony or bleeding (prophylactic role), in other studies the therapeutic role was intended. The status of the patients with respect to risk factors of uterine atony or post-delivery/post-caesarean bleeding is another important factor that needs to be taken into account.<sup>[9]</sup> In the present study, given the aforementioned studies as well as the researchers' experiences, two doses of 20 IU and 60 IU in 500 ml serum were selected to be compared. According to the findings of the present study, the need for prescribing drug (18% vs. 0%), uterine atony (5.5% vs. 0%), and blood transfusion (3.5% vs. 0%) were significantly higher in the group receiving the low dose of oxytocin. In a similar study conducted by Munn et al., the effect of two doses of oxytocin (oxytocin 10 IU in 500 ml and oxytocin 80 IU in 500 ml during 30 minutes) was compared in the prevention of post-caesarean uterine atony. The group with the low dose included 163 pregnant women, and the group with the high dose included 158 pregnant women. The percentage of need for extra uterine tonic drug was much higher in the group receiving the low dose (39% vs. 19%,  $p < 0.001$ ). The incidence rate of hypotension reported to be the same in both group.<sup>[10]</sup> The prevalence of post-delivery uterine atone varied

from 2 to 7 percent in other studies.<sup>[11]</sup> As it was observed, the findings of the aforementioned studies conform to those of the present study with respect to the excellence of oxytocin high dose in preventing uterine atony as well as the incidence rate of uterine atony. One of the limitations of the present study was error in laboratory calculation. It was attempted to minimize this limitation. In case of non-compliance with the patient's clinical status, the tests were repeated.

### Conclusion

According to the findings of the present study, in comparison with a low dose (20 IU), prescribing oxytocin with a high dose (60 IU) in pregnant women candidates for caesarean section significantly reduced the need for using extra uterine contractility drugs, uterine atony, and blood transfusion. Moreover, post-caesarean hemodynamic instability and drop of serum hemoglobin hematocrit was significantly higher in the group receiving a low dose of oxytocin.

### Conflict of Interest

All authors disclose that there was no conflict of interest.

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