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Efficacy of low dose vs. high dose oxytocin regimen for induction of labour

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Abstract
Background and Aim: Synthetic oxytocin is one of the most frequently used medications in obstetric care and the common routine for augmentation of labour. High dose oxytocin has high risk of excessive uterine contraction or tachysystole. Present research is an attempt to evaluate effectiveness of low dose versus high dose regimen for induction of labour.
Material and Methods: A total of 200 antenatal patients who were admitted for induction of labour were enrolled in the study. All patients were randomised by block randomisation into two groups i.e. Group I and Group II, each consisting of 100 patients. A detailed history, thorough clinical examination and relevant investigations were done for all the women. Per vaginal examination was done to know the cervical status and the bishop score. High dose regimen was started with 4mu/min with increment of 4mu/min up to a maximum of 32mu/min and low dose regimen was started with 2mu/min with increment of 2mu/min up to a maximum of 32mu/min. Induction to delivery interval was the primary outcome. Secondary outcomes noted were rate of caesarean section, tachysytole with or without fetal distress, failed induction, maternal outcomes like need for instrumental vaginal delivery, PPH and choriamnionitis, neonatal outcomes like NICU admission, umbilical cord pH and apgar score.
Results: Women induced with high dose oxytocin regimen had shorter induction delivery interval as compared to low dose oxytocin interval by 2 hours 9 minutes. The incidence of various maternal outcomes in the high dose and low dose oxytocin regimen were similar. The most common indications for LSCS in the two groups were fetal distress and failed induction. A special consideration is required for the incidence of tachysystole, which was more in high dose regimen as compared to low dose oxytocin regimen but the difference was not statistically significant.
Conclusion: High dose oxytocin regimen can be considered for induction of labour as it has same effects as that of low dose regimen with lesser induction to delivery interval.

Keywords: Labour, oxytocin, tachysystole, uterine contraction

Introduction
Induction of labor (IOL) refers to the iatrogenic stimulation of uterine contractions before the onset of spontaneous labor to accomplish vaginal delivery (VD) [1, 2]. Induction of labour (IOL) refers to artificial stimulation of uterine contractions before the true onset of spontaneous labour in order to achieve vaginal delivery [3]. The goal of labor induction is always to ensure the best possible outcome for mother and newborn. IOL should be performed only when there is a clear medical indication for it and the expected benefits outweigh its potential harms. Wherever possible, it has to be carried out in facilities where caesarean section can be performed [4].
Synthetic oxytocin is one of the most frequently used medications in obstetric care and the common routine for augmentation of labour. However, the effectiveness of oxytocin for treating abnormal progress has been questioned [5, 6]. Despite that, over time an increased use of oxytocin during labour has been noted. An unstructured manner of using the drug prevails [7, 8]. and its use can lead to hyperactive uterine contractions, which have been associated with negative effects on the fetus [9, 11]. Therefore, oxytocin has been designated as a high-alert medication [12]. Checklists and standardised protocols for the use of oxytocin have been recommended with the aim of reducing adverse neonatal outcomes [13, 14]. A meta-analysis of 8 trials comparing high and low dose oxytocin for induction of labour found no difference in CS rates, although more "uterine hyperstimulation" was noted in the high dose group [15]. Knowledge and consensus are lacking, however, regarding the proper dosage when oxytocin is used for accelerating slow progress of labour [16].

The Royal college of obstetricians and gynecologists (RCOG) recommends an initial dose of 1-2mu/min with arithmetic increments at 30min intervals until a maximum of 32mu/min [4]. The American college of obstetricians and gynecologists (ACOG) recommends an initial dose of 1-2mu/min with increments of 1-2mu/min at 30 minute intervals until every 2-3min contractions, up to a maximum of 42mu/min [5].

Cochrane systemic review and other studies have found high dose oxytocin regimen to be associated with shorter induction delivery interval compared to low dose regimen [6-9]. High dose oxytocin has also been associated with decrease in caesarean section [6]. However, study by Prichard N *et al*. have shown no significant difference in the rates of caesarean section between both the oxytocin regimens [11]. High dose oxytocin has high risk of excessive uterine contraction or tachysystole. The regimen has been found to be associated with several maternal adverse effects like hyponatremia, hypotension, arrhythmia, tachysystole and neonatal adverse effects such as seizures, hyperbilirubinemia, retinal haemorrhages, and fetal distress.[8] Low dose regimen has prolonged induction delivery interval with better safety profile with fewer episodes of hyperstimulation [11].

Current induction of labour regimens include both high and low dose regimens but evidence is not strong enough to recommend low dose or high dose regimen for routine induction of labour. Thus, further research is required to be carried out for the betterment of maternal and neonatal outcomes along with successful induction rates. Hence, this study is an attempt to evaluate effectiveness of low dose versus high dose regimen for induction of labour.

Material and Methods

A total of 200 antenatal patients who were admitted for induction of labour were enrolled in the study. All patients were randomised by block randomisation into two groups i.e. Group I and Group II, each consisting of 100 patients.

Pregnant mothers with Intra Uterine Fetal Death (IUFD), critically ill pregnant mothers, pregnant mothers with lethal congenital anomaly, pregnancies complicated by cord prolapse, induced pregnancy for whom cesarean section (CS) was done for non-obstetric indication like social reason were excluded from the study.

Primary outcome was estimation of Induction delivery interval. Secondary outcomes were rates of caesarean section, tachysystole with or without fetal distress, failed induction, maternal outcomes like incidence of instrumental vaginal delivery, PPH, chorioamnionitis, neonatal outcomes like admission to NICU, apgar score at 1 minutes and 5 minutes, umbilical cord pH and perinatal morbidity and mortality.

A detailed history, thorough clinical examination and relevant investigations were done for all the women. Vital signs of patient were obtained. Per vaginal examination was done to know the cervical status and the bishop score. If bishop score was less than 6, pre-induction cervical ripening was done using dinoprostone gel (0.5mg) up to a maximum of 2 doses. If bishop was more than 6, they were induced with Oxytocin according to the regimen assigned to her after block randomization.

Group I women received high-dose oxytocin regimen starting with 4mu/min with increment of 4mu/min every 30 min until adequate contractions (3-4 in 10 min) were established or up to a maximum of 32mu/min. Group II women received oxytocin at 2mu/min with increment of 2mu/min every 30min until adequate contractions were established or up to a maximum of 32mu/min. Uterine contractions and fetal heart rate were monitored by palpation and auscultation, respectively, with intermittent cardiotocographic (CTG) monitoring to identify fetal distress. If vaginal delivery was not achieved within 24 hours of oxytocin administration, induction was considered as 'failed' and further management was decided depending upon indication of induction. In case of tachysystole (>5 contractions per 10 minute period averaged over 30 minutes) with non-reassuring FHR pattern, oxytocin was discontinued, left lateral positioning was advised, IV bolus of 250-300ml ringer lactate and oxygen by mask at 8-10liters/min was given.

If tachysystole occurred with reassuring fetal heart rate, then oxytocin was reduced to previous dose. If uterine activity did not return to normal, then oxytocin was stopped. If oxytocin had been stopped for 20min, FHR was reassuring and no tachysystole was present, then oxytocin was started at half the previous rate at which the tachysystole occurred and was thereafter increased every 30 minutes until adequate uterine contractions were achieved or up to the maximum rate. All the events of induction of labour were recorded in excel sheet. Neonates were further followed for the adverse outcomes.

Statistical analysis

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2007) and then exported to data editor page of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA). For all tests, confidence level and level of significance were set at 95% and 5% respectively.

Results

Participant's basic characteristics such as mean age, parity, gestational age, indications for IOL, bishop's score, and cervical dilatation were similar between the two groups as shown in Table 1 below. All women were nulliparous. The most common indication for IOL in both groups was IHCP. Other indications are listed in Table 2.

Women induced with high dose oxytocin regimen had shorter induction delivery interval as compared to low dose oxytocin interval by 2 hours 9 minutes. The outcome was found to be statistically significant ($p \leq 0.05$) as shown in Table 3. However, there was no difference in the duration of second stage of labour among the two regimens.

The incidence of various maternal outcomes in the high dose and low dose oxytocin regimen were similar. The most common indications for LSCS in the two groups were fetal distress and failed induction. A special consideration is required for the incidence of tachysystole, which was more in high dose regimen as compared to low dose oxytocin regimen but the difference was not statistically significant. ($p \leq 0.05$) Neonatal outcomes were also not statistically different among the two regimens. The most common neonatal morbidity was neonatal jaundice in high dose and in low dose regimen which required admission to neonatal care unit. Umbilical cord pH was normal in all the patients. There was no maternal or perinatal mortality.

Table 1: Comparison of demographic data and bishop's score in high dose and low dose oxytocin regimen

Variable	Group-I: 4mu/min (n=100)	Group-II:2mu/min (n=100)	P value
Age (year)	28.40±3.78	27.01±3.12	0.1
Gestational age (weeks)	37.01±0.86	37.82±1.05	0.65
Pre-induction agent (required)	52 (52%)	50 (50%)	0.47
Post-induction bishop's score	6.10±0.47	6.7±0.52	0.10
Cervical dilatation(cm)	2.53±0.23	2.40±0.36	0.55

Statistically significance at $p \leq 0.05$

Table 2: Comparison of indication of IOL between high dose and low dose oxytocin regimen

Indication of IOL	High dose oxytocin regimen (n=100) (%)	Low dose oxytocin regimen (n=100) (%)	Total N (%)	P value
FGR	18 (18)	16 (16)	34 (17)	0.50
Gestational diabetes mellitus	10 (10)	12 (12)	22 (11)	
Gestational hypertension	10 (10)	8 (8)	18 (9)	
IHCP	36 (36)	34 (34)	70 (35)	
Postdated pregnancy	14 (14)	14 (14)	28 (14)	
Preeclampsia	4 (4)	8 (8)	12 (6)	
PROM	8 (8)	8 (8)	16 (8)	
Total	100 (100)	100 (100)	200 (100)	

Statistically significance at $p \leq 0.05$

Table 3: Comparison of induction delivery interval (in hours) between high dose and low dose oxytocin regimen

Induction delivery interval (in hours)	High dose oxytocin regimen (n=78)	Low dose oxytocin regimen (n=80)	Total	P value
Mean± Std. dev	6.96±3.77	9.05±4.65	8.01±4.34	0.01*

* indicates statistically significance at $p \leq 0.05$

Discussion

Active management of labour is a very delicate process in obstetrics. It requires utmost attention in order to reduce maternal and neonatal morbidity and mortality along with high success rates. In the present era, there exists considerable controversy and lack of evidence about oxytocin administration and dosage.

The primary outcome of the study, induction to delivery interval, was found to be statistically shorter in high dose oxytocin regimen as compared to low dose oxytocin regimen by 2 hours 9 minutes ($p \leq 0.05$). In a systemic review (2010) Wei SQ *et al*, decrease in labour duration along with a small increase in spontaneous vaginal delivery was observed with high dose oxytocin regimen as compared to low dose oxytocin regimen.[7] Similarly, studies by Rintaro Mori *et al*. in 2011 and A. Ghidini *et al*. in 2012 reported significant reduction in length of labour duration in high dose oxytocin regimen when compared with that of low dose oxytocin regimen [17, 18]. In a recent randomised controlled trial by L. Selin *et al*. (2018), duration of labour was found to be 23 minutes shorter with high-dose regimen of oxytocin when compared with that of low dose regimen.[8] Similarly, in a multicentre comparative study conducted by Tesemma MG *et al*. in 2020, the mean "Induction to delivery time" was 5.9 hr and 6.3hr for participants who received high dose Oxytocin and low dose Oxytocin respectively showing mothers receiving high dose oxytocin regimen had slightly shorter duration of labour [10].

Similarly, delivering to normal birth weight neonate compared to macrosomic neonate has increased success by 4 times. This might be justified by the fact that macrosomia is associated with labor dystocia and cephalo-pelvic disproportion thus ending in cesarean delivery. Our finding however, was not consistent with different literatures of the similar settings in Ethiopia that showed no association between neonatal birth weight outcome and induction success [19-21].

In the present study, high dose oxytocin regimen had increased incidence of uterine tachysystole, but the difference was not statistically significant. In a Cochrane review by A.Budden *et al*. significant increase in hyperstimulation was reported without specifying fetal heart rate changes in the high-dose group [9]. Also, B. G. Manjula *et al*. (2014) reported an increased rate of tachysystole in patients induced with high dose oxytocin regimen (p value 0.0040) [22].

The proportion of women experiencing adverse events did not differ significantly between the two regimens. Hereby, taking into account all the above outcomes and interpretations, we concluded that high dose oxytocin regimen can be considered for induction of labour as it has same effects as that of low dose regimen with lesser induction to delivery interval. The limitation of the present study was small sample size. Hence, the results of the study cannot be extrapolated to the general population.

Conclusion

On the basis of present study, high dose oxytocin regimen can be considered for induction of labour as it has same effects as that of low dose regimen with lesser induction to delivery interval. We recommend researchers to conduct multicenter research on a large number of patients that controls confounders to see the real effect of different oxytocin regimens on induction success.

References

1. Deborah AW, Lili S. Abnormal Labor and Induction of Labor. In: Steven GG, Jennifer RN, Joe LS *et al*. Obstetrics: Normal and Problem Pregnancies, 7th edition. China: Philadelphia, PA: Elsevier, 2017, 276-283.
2. American College of Obstetricians and Gynecologists. Induction of labor. ACOG practice bulletin #107. Obstet Gynecol, 2009;114:386-397. Doi:10. 1097/AOG.0b013e3181b48ef5.
3. Goel K, Gedam JK, Rajput DA, Bhalerao MV. Induction of Labor: A Review. Indian J Clin Pract. 2014;24(11):105-64.
4. WHO recommendation for induction of labour. Geneva: World Health Oraganisation, 2011. Available at http://whqlibdoc.who.int/hq/2011/WHO_RHR_11.10 _eng.pdf.
5. Royal College of Obstetricians and Gynaecologists (RCOG). Induction of labour, Evidence-based Clinical Guideline Number 9. RCOG Clinical Effectiveness Support Unit, London: RCOG Press, 2001.
6. The American Congress of Obstetrician and Gynecologists (ACOG). Optimizing Protocols in Obstetrics: Oxytocin for induction, 2011, 10-3. Available from http://mail.ny.acog.org/website/OxytocinForInductio n.pdf.
7. Wei SQ, Luo ZC, Qi HP, Xu H, Fraser WD. Highdose vs low-dose oxytocin for labor augmentation: A systematic review. Am J Obstet Gynecol. 2010;203(4):296-304.
8. Selin L, Wennerholm UB, Jonsson M, Dencker A, Wallin G, Wiberg-Itzel E, *et al*. High-dose versus low-dose of oxytocin for labour augmentation: a randomised controlled trial. Women and Birth. 2019;32(4):356-63.
9. Budden A, Chen LJY, Henry A. High-dose versus low-dose oxytocin infusion regimens for induction of labour at term. 2014;10:CD009701.

10. Tesemma MG, Sori DA, Gemeda DH. High dose and low dose oxytocin regimens as determinants of successful labor induction: a multicenter comparative study. BMC Pregnancy Childbirth. 2020;20(1):4-11.
11. Prichard N, Lindquist A, Hiscock R, Ruff S, Tong S, Brownfoot FC. High-dose compared with low-dose oxytocin for induction of labour of nulliparous women at term. J Matern Neonatal Med. 2019;32(3):362-8.
12. Hourvitz A, Alcalay M, Korach J, Lusky A, Barkai G, Seidman DS. A prospective study of high- versus low-dose oxytocin for induction of labor. Acta Obstet Gynecol Scand. 1996;75(7):636-bv ccv41
13. Institute for Safe Medical Practices. ISMP List of High-Alert Medications in Acute Care Settings, 2014. http://www.ismp.org/Tools/institutionalhighAlert. asp. [Accessed 14 February 2018].
14. Clark S, Belfort M, Saade G, Hankins G, Miller D, Frye D, *et al*. Implementation of a conservative checklist-based protocol for oxytocin administration: maternal and newborn outcomes. Am J Obstet Gynecol. 2007;197(5):480.e1-5.
15. Hayes EJ, Weinstein L. Improving patient safety and uniformity of care by a standardized regimen for the use of oxytocin. Am J Obstet Gynecol. 2008;198(6):622.e1-7.
16. Budden A, Chen LJ, Henry A. High-dose versus low-dose oxytocin infusion regimens for induction of labour at term. Cochrane Database Syst Rev. 2014;10:Cd009701.
17. Mori R, Tokumasu H, Pledge D, Kenyon S. High dose versus low dose oxytocin for augmentation of delayed labour. 2011;10:CD007201.
18. Ghidini A, Wohlleb D, Korker VC, Pezzullo JH, Poggi S. Effects of two different protocols of oxytocin infusion for labor induction on obstetric outcomes: A cohort study. Open J Obstet Gynecol. 2012;02(02):106-11.
19. Woubishet G, Fitsum T, Mirkuzie W. Outcome of induction and associated factors among term and post-term mothers managed at Jimma University specialized hospital: a two years' retrospective analysis. Ethiop J Health Sci. 2016;26(2):121-130. Available at http://dx.doi.org/10.4314/ejhs.v26i2.6.
20. Hurissa BF, Geta M, Belachew T. Prevalence of Failed Induction of Labor and Associated Factors Among Women Delivered in Hawassa Public Health Facilities, Ethiopia. J Women's Health Care. 2015;4:253. Doi:10.4172/2167-0420.1000253.
21. Abdulkadir Y, Dejene A, Geremew MA, Dechasa B. Induction of labor prevalence and associated factors for its outcome at Wolliso St. Luke, Catholic Hospital, south west Shewa, Oromia. Intern Med. 2017;7:5. Doi:10. 4172/2165-8048.1000255.
22. Manjula BG, Bagga R, Kalra J, Dutta S. Labour induction with an intermediate-dose oxytocin regimen has advantages over a high-dose regimen. J Obstet Gynaecol. 2014;35(4):362-7.