

Research Article

Does Early Administration of Epidural Analgesia Affect the Rate of Cesarean Sections and other Obstetric Outcomes in Nulliparous Women?

Dr Lamia Khalil¹, Dr Saadia Sharif*, Dr Shazia Irshad², Dr Saba Hamidi³, Dr Saima Ahmad⁴

1. Head of Department OB/GYN Dallah Hospital.
2. Consultant Obs/Gynae, Dallah Hospital Riyadh.
3. Specialist Dallah Hospital, Riyadh, KSA.
4. MRCOG, Dubai.

***Corresponding Dr Saadia Sharif.** FCPS, Consultant Obs/Gynae Dallah Hospital Riyadh, KSA.

Received Date: March 21, 2021

Publication Date: April 01, 2021

Abstract

Objective: This present study was designed to ascertain the impact of early initiation of Epidural Analgesia with Ropivacaine in nulliparous women on the rate of cesarean sections and other obstetric outcome measures.

Methods: This was a retrospective study conducted on Nulliparous women in early labor at Dallah hospital during a period of 12 months (from January 2019 to December 2019).

Results: A total of 1850 nulliparous parturients in the hospital participated in the study. The proportion of deliveries without epidural analgesia were higher than those using epidural in different methods during the whole year. However, when using instrumental Deliveries (ventouse and forceps) there were variable results; some periods scored a higher proportion of women receiving epidurals than those without.



Conclusion: *We have found that epidural analgesia is a safe method for pain relief during labor, and it is not associated with an increase in CS deliveries may support an association with an increased risk of instrumental vaginal delivery. Fears about a higher risk of the cesarean section should not be considered as a discouragement for epidural analgesia administration in nulliparous women if requested.*

Keywords: *Nulliparous Women; Epidural Analgesia; Cesarean Sections; Instrumental Vaginal Delivery.*

Introduction

Since the second half of the 20th century, proper analgesia for labor pain was presented in the form of Epidural analgesia, an indwelling plastic catheter, providing the most effective persistent pain release (1, 2). Despite the very high acceptance rate, epidurals have some potential disadvantages. Previous observational studies have shown epidural analgesia as a risk factor for an increased number of instrumental deliveries, hypotension, fever, prolonged labor and delivery, and a raised demand for oxytocin (2). Its usage has additionally been associated with dystocia. Women receiving epidurals are at higher risk to require oxytocin for labor augmentation, have prolonged second stages of labor, and present persistent occiput posterior fetal malposition (2).

The coexistence of growing cesarean delivery rates and labor epidural analgesia rates has inspired controversy as to whether the application of epidural analgesia is causally linked with an increased risk of cesarean delivery (3). Furthermore, its impact on nulliparous labor and delivery persists controversial. A previous investigation on epidural analgesia described an association between timing of initiation of epidural analgesia and cesarean delivery; women who underwent epidural placement at less than 4 cm (early in labor) had a cesarean delivery two-folds higher than that of women who first received epidural analgesia after 4 cm dilatation (4).

However, a recent study showed no significant association between timing of epidural analgesia administration and risk of cesarean delivery (5). There remains whether there is a cause-and-effect relationship between the use of epidural analgesia and prolonged labor or operative delivery or whether the request for analgesia was simply a marker for some other risk factor for cesarean delivery (such as dysfunctional labor, macrosomia, mal-presentation) (6). Furthermore, in a randomized controlled trial



conducted on nulliparous women, epidural analgesia was associated with a significant prolongation in the first and second stages of labor and a significantly higher frequency of cesarean delivery, principally linked to dystocia (7). However, other authors have found that early administration of epidural analgesia did not affect obstetric outcomes in nulliparous women, including prolonged labor and incidence of operative delivery (8). It is suggested that epidural analgesia is associated with a lower rate of spontaneous vaginal delivery, and an increase in the risk of instrumental vaginal delivery (9).

Many aspects of labor-management require an evidence-based approach. At present, there is little information about the effect of epidural analgesia in nulliparous women as derived from randomized trials of different approaches, especially in Saudi Arabia. A retrospective study designed to ascertain the impact of early initiation of Epidural Analgesia with Ropivacaine in nulliparous women on the rate of cesarean sections and other obstetric outcome measures.

Materials and Methods

Study Design and Participants

This was a retrospective study conducted on Nulliparous women in early labor at Dallah hospital during a period of 12 months (from January 2019 to December 2019). Women meeting the following criteria were invited to participate in the study: nulliparity, at least 36 completed weeks of gestation, established labor (either spontaneous or induced), with at least 2 painful contractions in 10 minutes, and cervix at least 80% effaced, and up to 3 cm dilated. However, exclusion criteria included contraindications to Epidural Analgesia, cervical dilatation of more than 3 cm at the time of enrollment, estimated fetal weight above 4000 g, medical complications (preeclampsia, pregnancy-induced hypertension, gestational and insulin-dependent diabetes), and abnormal admission fetal heart rate tracing. We sequentially excluded parturients with incomplete data records, a regimen other than ropivacaine, preterm labor or termination, failed or replaced epidural catheterization during Epidural Analgesia, and admission for induction of labor.

Procedure

Simple randomization was done by allocating every alternate woman recruited for the study to receive or not to receive Epidural Analgesia. Randomization was achieved by selecting one of the numbered opaque envelopes prepared by an uninvolved third party, indicating the assigned group. The randomization process was stratified according to the onset of labor, being either spontaneous or induced.



Episodes of hypotension, defined as systolic blood pressure 20% less than the baseline were managed by rapid infusion of lactated Ringer's solution 5mL/kg and intravenous boluses of ephedrine 5 mg, as required. Automated maternal blood pressure and heart rate, dynamometry, and continuous fetal heart rate were monitored throughout labor.

Epidural Analgesia

Epidural Analgesia was started when cervical dilatation was at least 4 to 5 cm, and until that time analgesia was provided by intramuscular pethidine. The epidural insertion followed intravenous pre-hydration with 500-1000 ml of lactated Ringers solution. The lower lumbar epidural space L3-L4 or L4-L5 was identified by the loss-of-resistance technique with an 18-gauge Tuohy needle with the parturient in a sitting or lateral position. An epidural catheter was inserted into the epidural space and advanced 3-5 cm beyond the tip of the needle. If no signs of an intravascular or subarachnoid puncture were observed, the catheter was secured and the parturient was placed in the supine position with left uterine displacement.

All parturients received a standardized epidural protocol when requiring analgesia which consisted of a test dose of xylocaine 2% 3ml with 1:200000 epinephrine, then 10ml initial loading dose of bupivacaine 0.25% (2.5 mg/ml) and fentanyl (2mg/ml), and a continuous maintenance dose of bupivacaine 0.125% (1.25 mg/ml) combined with fentanyl (2mg/ml) given at a rate of 10 ml/hour after 15 minutes of normal recordings (electrocardiography, automated noninvasive blood pressure, and fetal heart rate monitoring). Epidural analgesia was continued through the second stage of labor.

Variables

Active labor was defined as regular uterine contractions with cervical dilatation of ≥ 4 cm with at least 80% effacement and with the engagement of the vertex.

Pain score was obtained at the time of randomization using a standard visual analog pain scoring system. Participants were asked to grade their pain from 0: "no pain," to 10: "worst pain imaginable". Pre-labor characteristics included: maternal age, body height, and weight. Labor characteristics included: durations from admission to delivery and initiation of epidural analgesia to delivery, the duration of the active phase of the first stage and the second stage, and parturients complaints after epidural anesthesia (including nausea, vomiting, backache, and dizziness).



Labor outcomes considered: the mode of delivery, the primary indication for cesarean section, Apgar scores of the newborn, and postpartum hemorrhage. The extent of cervical dilatation when initiating epidural analgesia was also recorded.

Ethical consideration

The study was approved by the local ethics committee. Informed signed consent was obtained from women before the commencement of the study.

Statistical Analysis

All statistical analyses were done using SPSS version 26. Statistical significance was taken at the 95% level ($P < 0.05$). Results were expressed as frequency and percentages for categorical variables. Differences in categorical variables were analyzed with the Pearson chi-square test, or with Fisher's exact test when conditions are not fulfilled.

Results

There were a total of 1850 nullipara parturients in the hospital during the study period. **(Table 1)** reported a comparison between the epidural analgesia group and the non-epidural group regarding different types of deliveries. When comparing normal spontaneous vaginal delivery NSVD and instrumental deliveries (forceps & ventouse deliveries) regarding epidural analgesia, there was no significant increase in the incidence of instrumental deliveries among women who received epidural analgesia (72 vs 48). However, there was a significant increase in the non-epidural group in all types of deliveries except for Caesarean section (C/S) deliveries ($p\text{-value} > 0.05$). The highest number of nullipara deliveries was during May (180 women), whereas the lowest was during February (120 women) **(Figure 1)**.

After allocating into groups, the proportion of deliveries without epidural analgesia was much higher than those using epidural during the whole year. **(Figure 2)** showed the total number of different types of nullipara delivery; normal spontaneous vaginal delivery (NSVD) was the most reported type of delivery during the study period (min=85 women and maximum=125 women), followed by Caesarean section deliveries (min=18 women and maximum=27 women), and instrumental deliveries (ventouse and forceps respectively). **(Figures 3 and 4)** presented the total number of nullipara delivered by different methods during the year, showing the difference between both epidural & non-epidural groups. Similarly, the proportion of deliveries without epidural analgesia was higher than those using epidural in different methods during the whole year. However, when using instrumental Deliveries (ventouse and forceps)



there were variable results; some periods scored a higher proportion of women receiving epidurals than those without (Nov for forceps; Jan to April for Vantouse).

Table 1: Comparison between with and without epidural analgesia groups regarding to different type of deliveries a Compared to NSVD. *Pearson’s Chi-square test was used. **Fisher’s exact test was used.

	Epidural Analgesia	Without Epidural	P-Value
NSVD (n=1850)	463 (25%)	1387 (75%)	0.034 *
Instrumental Deliveries ^a (n=120)	48 (40%)	72 (60%)	< 0.0001*
Ventouse (n=80)	48 (40%)	132 (60%)	< 0.0001*
Forceps (n=11)	7 (54%)	4 (46%)	0.019 **
C/S (n=280)	85 (30%)	195 (70%)	0.051 *

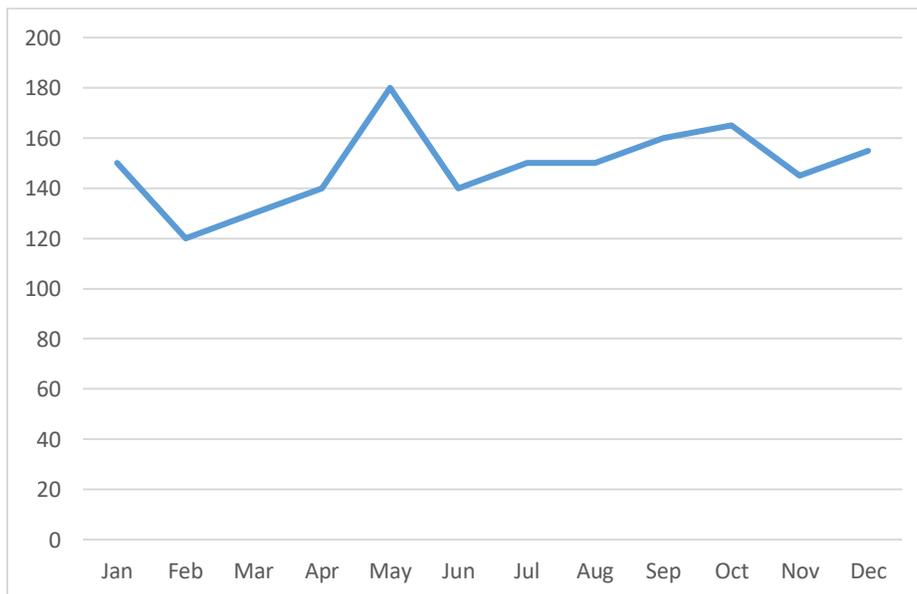


Figure 1: Total Nullipara deliveries in different months in Dallah hospital during 2019

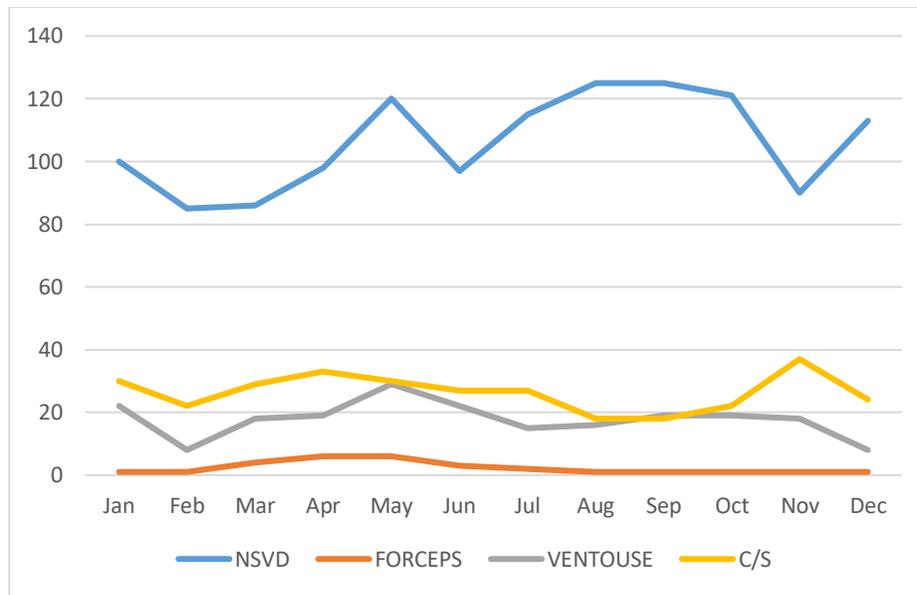


Figure 2: Different types of delivery methods in Dallah hospital during 2019

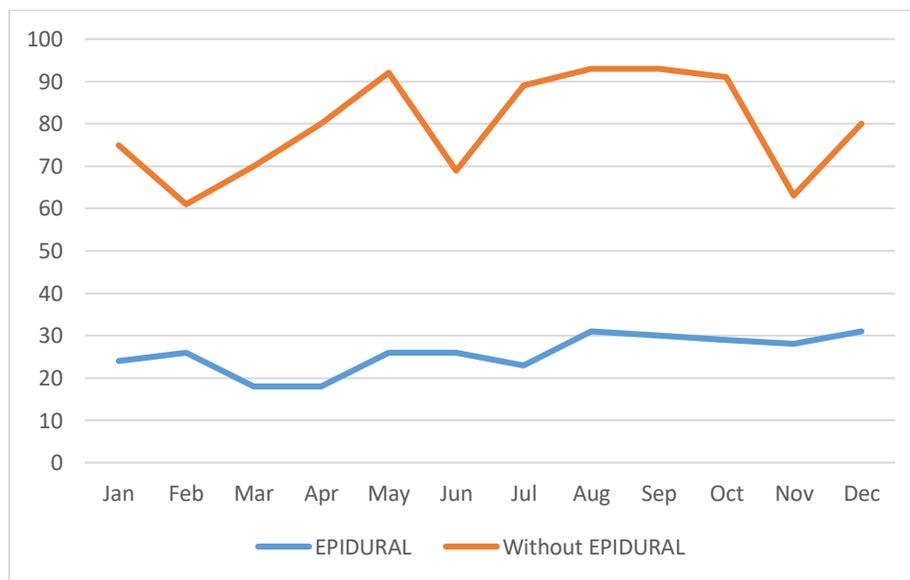


Figure 3: Nullipara NSVD deliveries in Dallah hospital during 2019

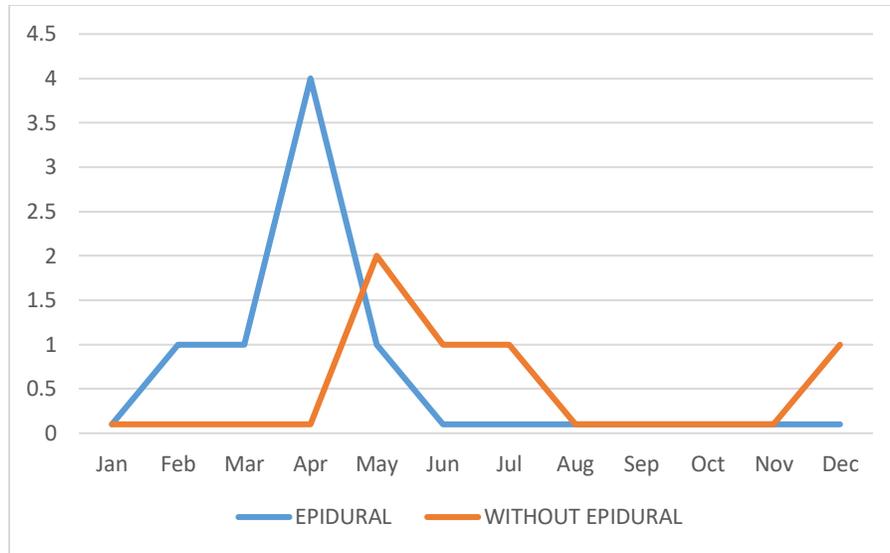


Figure 4: Nullipara forceps deliveries in Dallah hospital during 2019

Discussion

The present study had major findings: a) Epidural analgesia in nullipara did not raise the incidence of primary cesarean sections, b) The instrumental delivery rate and the percentage of patients with arrested labor as primary indications for cesarean section were irrelevant to the initiating epidural analgesia. These facts should always be discussed with parturients to allow them to make informed decisions.

The effect of regional analgesia on the progress of labor and mode of delivery has often been debated. Results of randomized controlled trials (RCTs) published had similar findings and did not demonstrate any difference in the rate of cesarean deliveries between women who had received EA and women who only received intravenous analgesia (10). A landmark study by Wong et al., also aligned with our results, provided evidence that early epidurals when compared to late epidurals do not cause an increased rate of cesarean deliveries and instrumental vaginal deliveries in nulliparous women with spontaneous labor (11). Other studies did not also establish a direct correlation between epidural analgesia and instrumental delivery (2).

However, other evidence had opposing findings where EA was associated with an increased risk of instrumental vaginal birth compared with deliveries with non-epidural analgesia or no analgesia by causing an extension and difficulty in the flexion of the fetus head (12, 13). Previous studies also suggested the positive association between EA and the increased risk of instrumental vaginal delivery (14, 15). These differences in instrumental vaginal delivery rates may be attributed to differences in



protocols for the management of labor. Also, it must be taken into consideration that longer deliveries are a risk factor for instrumental vaginal and cesarean deliveries (16).

We concentrated on nulliparous women given that the indications for cesarean section vary with parity; for instance, the main indication in nulliparous women is dystocia, yet it is a prior cesarean section in multiparous women (17). Our analysis does not support an association between epidural analgesia and an increased risk of cesarean delivery for dystocia, but the analysis may support an association with an increased risk of instrumental vaginal delivery.

The administration of Epidural analgesia may raise the risk of instrumental delivery by various mechanisms including a) the reduction of oxytocin secretion due to intravenous fluid infusions before epidural analgesia and causing weakening of uterine activity (18), b) on the other hand, the enhanced use of oxytocin after beginning epidural analgesia may show attempts at speeding up labor with a risk of impaired maternal efforts at expulsion and fetal malposition during descent (19), and c) longer-lasting labor is associated with a higher risk of neonatal morbidity and mortality justifying assisting delivery, leading to increased rates of instrumental delivery (16).

Numerous strategies, both pharmacologic and non-pharmacologic, have been used as treatment. However, childbirth is a multidimensional experience and when considering treatment, one must balance between pain relief and other aspects, such as physical, emotional, psychological, sociologic, and sometimes religious considerations. In other words, pain relief may not be enough to make childbirth a fulfilling and satisfactory experience.

There are some limitations to our study. Due to the retrospective design of the study, we could not control for variations in analgesic and anesthetic techniques. Our study showed that among nullipara have administered epidural analgesia, a total of 1850 women had normal spontaneous vaginal deliveries (NSVD), 80 were delivered by ventouse extraction, 280 were delivered by cesarean section, and 11 were delivered by forceps delivery. There is a significant difference between NSVD and instrumental deliveries using epidural analgesia. The absence of complications is attributed to the good selection of patients who were administered epidural analgesia and the efficacy of anesthetists who were all consultants.

Conclusion

In conclusion, we have found that epidural analgesia is a safe method for pain relief during labor, and it is not associated with an increase in CS deliveries may support an association with an increased risk of instrumental vaginal delivery. Fears about a higher risk of the cesarean section should not be



considered as a discouragement for epidural analgesia administration in nulliparous women if requested.

References

1. Toledano RD, Tsen LC. “Epidural Catheter Design: History, Innovations, and Clinical Implications”. *Anesthesiology*. 2014 Jul 1;121(1):9–17.
2. Penuela I, Isasi-Nebreda P, Almeida H, López M, Gomez-Sanchez E, Tamayo E. “Epidural analgesia and its implications in the maternal health in a low parity community”. *BMC Pregnancy Childbirth*. 2019 Jan 30;19(1):52.
3. Bannister-Tyrrell M, Ford JB, Morris JM, Roberts CL. “Epidural analgesia in labor and risk of cesarean delivery”. *Paediatr Perinat Epidemiol*. 2014 Sep;28(5):400–11.
4. Seyb ST, Berka RJ, Socol ML, Dooley SL. “Risk of cesarean delivery with elective induction of labor at term in nulliparous women”. *Obstet Gynecol*. 1999 Oct;94(4):600–7.
5. Lipschuetz M, Nir EA, Cohen SM, Guedalia J, Hechler H, Amsalem H, et al. “Cervical dilation at the time of epidural catheter insertion is not associated with the degree of prolongation of the first or second stages of labor, or the rate of instrumental vaginal delivery”. *Acta Obstet Gynecol Scand*. 2020;99(8):1039–49.
6. Jung H, Kwak K-H. Neuraxial analgesia: a review of its effects on the outcome and duration of labor. “*Korean J Anesthesiol*”. 2013 Nov 29;65(5):379–84.
7. Thorp JA, Hu DH, Albin RM, McNitt J, Meyer BA, Cohen GR, et al. “The effect of intrapartum epidural analgesia on nulliparous labor: A randomized, controlled, prospective trial”. *Am J Obstet Gynecol*. 1993 Oct 1;169(4):851–8.
8. Chattopadhyay I, Basu S, Jha AK. “Timing of administration of epidural analgesia and risk of operative delivery in nulliparous women: A case–control randomized study”. *J Obstet Anaesth Crit Care*. 2018 Jan 1;8(1):16.
9. Kesavan R, Rajan S, Kumar L. “Effect and Safety of Labor Epidural Analgesia with Intermittent



Boluses of 0.1% Bupivacaine with Fentanyl on Fetal and Maternal Outcomes and Wellbeing”. *Anesth Essays Res.* 2018;12(4):769–73.

10.”Epidurals for pain relief in labour [Internet]”. [cited 2021 Jan 24]. Available from: /CD000331/PREG_epidurals-pain-relief-labour

11.Wong CA, Scavone BM, Peaceman AM, McCarthy RJ, Sullivan JT, Diaz NT, et al. “The risk of cesarean delivery with neuraxial analgesia given early versus late in labor”. *N Engl J Med.* 2005 Feb 17;352(7):655–65.

12.Hasegawa J, Farina A, Turchi G, Hasegawa Y, Zanello M, Baroncini S. “Effects of epidural analgesia on labor length, instrumental delivery, and neonatal short-term outcome”. *J Anesth.* 2013 Feb;27(1):43–7.

13.Pergialiotis V, Vlachos D, Protopapas A, Pappa K, Vlachos G. “Risk factors for severe perineal lacerations during childbirth”. *Int J Gynaecol Obstet Off Organ Int Fed Gynaecol Obstet.* 2014 Apr;125(1):6–14.

14.Anim-Somuah M, Smyth RM, Cyna AM, Cuthbert A. “Epidural versus non-epidural or no analgesia for pain management in labor”. *Cochrane Database Syst Rev [Internet].* 2018 May 21 [cited 2021 Jan 24];2018(5). Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6494646/>

15.Jones L, Othman M, Dowswell T, Alfirovic Z, Gates S, Newburn M, et al. “Pain management for women in labor: an overview of systematic reviews”. *Cochrane Database Syst Rev [Internet].* 2012 Mar 14 [cited 2021 Jan 24];2012(3). Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7132546/>

16.Garcia-Lausin L, Perez-Botella M, Duran X, Mamblona-Vicente MF, Gutierrez-Martin MJ, Gómez de Enterría-Cuesta E, et al. “Relation between Length of Exposure to Epidural Analgesia during Labour and Birth Mode”. *Int J Environ Res Public Health [Internet].* 2019 Aug [cited 2021 Jan 24];16(16). Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6720813/>

17.Malonga FK, Mukuku O, Ngalula MT, Luhete PK, Kakoma J-B. “Étude anthropométrique et pelvimétrique externe chez les nullipares de Lubumbashi: facteurs de risque et score prédictif de la dystocie mécanique”. *Pan Afr Med J [Internet].* 2018 Oct 2 [cited 2021 Jan 24];31. Available from:



<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6457727/>

18.Boie S, Glavind J, Velu AV, Mol BWJ, Uldbjerg N, de Graaf I, et al. “Discontinuation of intravenous oxytocin in the active phase of induced labor”. Cochrane Database Syst Rev [Internet]. 2018 Aug 20 [cited 2021 Jan 24];2018(8). Available from:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6513418/>

19.Newton ER, Schroeder BC, Knape KG, Bennett BL. “Epidural analgesia and uterine function”. Obstet Gynecol. 1995 May;85(5 Pt 1):749–55.

Volume 1 Issue 3 April 2021

©All rights reserved by Dr Saadia Sharif