

## Comparison of Maternal and Perinatal Outcome Between 4 cm vs 6 cm Cervical Dilatation at Amniotomy

Seema Tariq, Tehreem Yazdani

Department of OBS & Gyane, Pak Emirates Military Hospital, Rawalpindi/National University of Medical Sciences (NUMS) Pakistan

### ABSTRACT

**Objective:** To compare maternal and perinatal outcome between 4 cm vs 6 cm cervical dilatation at Amniotomy among women undergoing induction of labor at our unit.

**Study Design:** Comparative cross-sectional study.

**Place and Duration of Study:** Obstetrics Department, Pak Emirates Military Hospital, Rawalpindi Pakistan, from Oct to Dec 2022.

**Methodology:** This study was conducted on women undergoing induction of labor at our unit. Women participating in this study were divided into two Groups. Group-I had Amniotomy at 4 cm of cervical dilatation while Group-II had Amniotomy at 6 cm of cervical dilatation. Both the Groups were followed up till the delivery for maternal outcome and 12 hours after the delivery for immediate peri-natal outcome. Maternal and perinatal outcomes observed in both Groups were compared for any significant difference.

**Results:** A total of 634 women with mean age of  $28.51 \pm 5.51$  years meeting the criteria were recruited for this study. Two Groups were made for comparison. 321(50.6%) women had Amniotomy at 4 cm dilatation while 313(49.4%) had Amniotomy at 6 cm dilatation. Statistical analysis showed that when both the Groups were followed up, no statistically significant difference was recorded in any of the maternal or peri-natal outcome parameters included in this study ( $p$ -value $>0.05$ ).

**Conclusion:** Induction of labor via Amniotomy could be done effectively both at 4 cm and 6 cm cervical dilatation. Both maternal and perinatal outcome parameters were not significantly different in women undergoing Amniotomy at these two different cervical dilatations in our study.

**Keywords:** Amniotomy; Cervical dilatation, Induction of labor.

**How to Cite This Article:** Tariq S, Yazdani T. Comparison of Maternal and Perinatal Outcome Between 4 cm vs 6 cm Cervical Dilatation at Amniotomy. *Pak Armed Forces Med J* 2025; 75(5): 909-912.DOI: <https://doi.org/10.51253/pafmj.v75i5.10959>

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<https://creativecommons.org/licenses/by-nc/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

### INTRODUCTION

Spontaneous labor may be augmented or helped with number of major and minor interventions by the managing obstetrics team. Maternal and child mortality and morbidity may be reduced manifold if these interventions are done in time by trained professionals in a well-equipped setting.<sup>1</sup> Timely interventions for induction of labour have been associated with good outcome for both mothers and babies and are recommended in all existing guidelines for management of labour.<sup>2</sup> Multiple methods have been used with their own merits and demerits of induction and augmentation of labour at different phases.<sup>3</sup>

Amniotomy is one of the methods done in routine in most of the women managed for labor in our part of the world.<sup>4</sup> Length of cervical dilatation is one of the important parameters used to observe the progress of labor and decided about the

interventions.<sup>5</sup> Wellbeing of mother and baby are of utmost in all this process and obstetrics team managing the labor take all decisions for having best outcome of labor both in terms of maternal and fetal outcome parameters.<sup>6</sup> Cervical dilatation lengths best suitable for performing Amniotomy or induction via other methods have been compared in the past. Kehila et al. revealed that both can be useful for the said purpose but carefully measured cervical length via transvaginal scan may be a more useful too.<sup>7</sup> Pereira et al. compared role of cervical length, angle of progression and cervical elastography in predicting successful induction of labour. They found out that angle of progression and cervical elastography had very limited role for predicting successful induction and only cervical length should be used in routine out of all these three parameters.<sup>8</sup> Rane *et al.*, in their study concluded that pre-induction cervical length, body mass index and other gestational parameters had a significant impact on the interval between induction and delivery within 24 hours, possibility of vaginal delivery and the risk of having caesarean section. It was clear from their study that obstetrics team should

**Correspondence:** Dr Seema Tariq, Department of OBS & Gyane, Pak Emirates Military Hospital, Rawalpindi Pakistan

Received: 27 Sep 2023; revision received: 02 Mar 2024; accepted: 04 Mar 2024

carefully include all these parameters into account while taking any decision regarding augmentation of labor.<sup>9</sup>

Most of the cases seen in routine are un-booked and sometimes ante-natal history is also not available to the obstetric team. Therefore, most of the decisions regarding labour are made by the team on the basis of clinical parameters recorded in the labour room. A recent local study published in 2023 assessed the diagnostic efficacy of Bishop Score and Transvaginal Ultrasonography in predicting successful induction of labour among labouring women managed at a tertiary care hospital of Islamabad. Limited local data is available regarding best cervical dilatation length for performing the Amniotomy. We therefore planned this study with the rationale to compare maternal and perinatal outcome between 4 cm vs 6 cm cervical dilatation at Amniotomy among women undergoing labor at obstetrics unit of Pak Emirates Hospital Military (PEMH) Rawalpindi.

## METHODOLOGY

The comparative cross-sectional study was conducted at the obstetrics unit of Pak Emirates military hospital Rawalpindi from October 2022 to December 2022. Sample size was calculated by WHO Sample Size Calculator by using two Groups. Group I had induction at cervical dilatation of 4 cm 16.6% while Group II had induction at cervical dilatation of 6 cm 7.2%.<sup>11</sup> Non probability Consecutive sampling technique was used to gather the sample.

**Inclusion Criteria:** All laboring women between age of 18 and 40 years with gravida 2 to 5 and previous spontaneous vaginal deliveries were included.

**Exclusion criteria:** Mothers with uncontrolled systemic illnesses like diabetes mellitus or hypertension or any other such disorders were not recruited. Primigravida were not included and also multigravida with previous cesarean sections scars were excluded. Women with abnormal fetal growth or fetal anomalies were excluded as well. Those with multiple fetuses were also part of exclusion criteria.

After ethical approval from the Ethical Review Board Committee (IREB letter no. A/28/EC/569/23) all the women who were undergoing labor at our obstetric unit and met the criteria were recruited in this study. Women were divided into two Groups on the basis of randomization by lottery method. Group-I had amniotomy at 4 cm dilatation while Group-II had at 6 cm. Cervical dilatation was measured by

consultant obstetrician by set method and it was defined as the linear distance between opposite margins of cervical orifice.<sup>12</sup> Amniotomy in both Groups was also performed by trained and experienced member of the team as per set protocols.<sup>13</sup> All the study participants were then followed up for outcome of labor and then neonates delivered were also followed up in neonatal intensive care unit (NICU) for 12 hours to determine the peri-natal outcome. APGAR score for all the neonates was calculated by consultant neonatologist at 5 minutes of birth as per set protocols.<sup>14</sup> Data of both the study Groups was entered in a sheet which was later processed in software for detailed analysis.

Descriptive statistics were used for summarizing the data of women gathered during this study. Pearson chi-square analysis was applied to establish the statistically significant different among the different maternal and perinatal outcome parameters between two study Groups. Statistics Package for Social Sciences version 24.0 (SPSS-24.0) was used for this purpose. The *p*-values less than or equal to 0.05 were considered significant for establishing the difference in our data set.

## RESULTS

A total of 634 women who were undergoing labour at our unit and met criteria were recruited for this study. Mean age of these women was 28.51±5.51 years.

Table-I summarized the clinical and demographic profile of laboring women included in this study. Two Groups were made for comparison. 321(50.6%) women had Amniotomy at 4 cm dilatation while 313(49.4%) had Amniotomy at 6 cm dilatation.

**Table-I: Characteristics of Women included in the Study (n=634)**

| Study Parameters                        | n (%)            |
|-----------------------------------------|------------------|
| Age of Mothers (years) Mean±SD          | 28.51±5.51 years |
| <b>Cervical Dilatation at Amniotomy</b> |                  |
| 4 cm                                    | 321 (50.6%)      |
| 6 cm                                    | 313 (49.4%)      |
| <b>Caesarian Delivery</b>               |                  |
| No                                      | 473(74.6%)       |
| Yes                                     | 161(25.4%)       |
| <b>Instrumental Delivery</b>            |                  |
| No                                      | 557 (87.9%)      |
| Yes                                     | 77(12.1%)        |
| <b>Need for Oxytocin</b>                |                  |
| No                                      | 275(43.4%)       |
| Yes                                     | 359(56.6%)       |
| <b>Poor Neonatal Outcomes</b>           |                  |
| APGAR<7 at 5 minutes                    | 110(17.4%)       |
| Neonatal stay in ICU more than 12 hours | 171(27%)         |

APGAR: Appearance Pulse Grimace Activity and Respiration, ICU: Intensive Care Unit

Table-II summarized the results of statistical analysis performed for this study on data obtained from all the study participants. It was revealed that when both the Groups were followed up, no statistically significant difference was recorded in any of the maternal or perinatal outcome parameters included in this study ( $p$ -value>0.05).

**Table-II: Comparison of various Maternal and Perinatal Parameters in Women who underwent Amniotomy at Cervical Dilatation of 4 cm versus 6 cm (n=634)**

| Outcome Parameters    | Amniotomy at 4 cm | Amniotomy at 6 cm | <i>p</i> -value |
|-----------------------|-------------------|-------------------|-----------------|
| Cesarean Section      |                   |                   |                 |
| No                    | 247(76.9%)        | 226(72.2%)        | 0.170           |
| Yes                   | 74(23.1%)         | 87(27.8%)         |                 |
| Need for Oxytocin     |                   |                   |                 |
| No                    | 131(40.8%)        | 144(46.1%)        | 0.187           |
| Yes                   | 190(59.2%)        | 169(54.9%)        |                 |
| Instrumental Delivery |                   |                   |                 |
| No                    | 287(89.4%)        | 270(86.2%)        | 0.225           |
| Yes                   | 34(10.6%)         | 43(13.8%)         |                 |
| APGAR at 5 Minutes <7 |                   |                   |                 |
| No                    | 273(85.1%)        | 251(80.1%)        | 0.106           |
| Yes                   | 48(14.9%)         | 62(19.9%)         |                 |
| NICU Stay             |                   |                   |                 |
| <12 hours             | 243(75.7%)        | 220 (70.2%)       | 0.125           |
| >12 hours             | 78(25.3%)         | 93(29.8%)         |                 |

APGAR: Appearance Pulse Grimace Activity and Respiration, NICU: Neonatal Intensive Care Unit

## DISCUSSION

Induction of labor is a vast area of obstetrics with different tools used for augmentation of different phases of this process. Amniotomy is one way of induction of labor and usually performed seeing the cervical dilatation in women. Different dilatation parameters have been used to perform this maneuver with certain merits and demerits. Studies have been performed on relationship of cervical dilatation parameters with both maternal and fetal outcomes but still there is no consensus on any one reading. Still there is a gap in existing literature regarding this practice. We targeted all the non-primiparous women undergoing labor at our unit to compare maternal and perinatal outcome between 4 cm vs 6 cm cervical dilatation at Amniotomy. Li *et al.*, from Taiwan published a retrospective cohort study and tried to look for association between cervical length and successful induction of labor. They revealed that a shorter cervical length was associated with better chances of successful induction of labour.<sup>15</sup> We compared two Groups, one with induction at 4 cm and other at 6 cm and found out there was no significant

difference in both Groups regarding maternal and peri-natal outcomes.

A Malaysian study compared pregnancy outcome between women induced labour at 4 cm vs 6 cm cervical dilatation. It was concluded that there no significant different in maternal and peri-natal outcome but women induced at 6 cm dilatation had more chances of caesarean section as compared to those at 4 cm.<sup>16</sup> We could not establish any such differences in both the Groups.

Another similar study published by Rosli *et al.* highlighted the impact of cervical dilatation at time of diagnosis of active phase of labour on outcome of pregnancy. They revealed that active phase of labour at 6 cm cervical dilatation was associated with lesser incidence of delivery via caesarean section, augmentation of labour and fewer neonatal complications.<sup>17</sup> Our results concluded that induction of labor via Amniotomy could be done effectively both at 4 cm and 6 cm cervical dilatation as both maternal and perinatal outcome parameters were not significantly different in women undergoing Amniotomy at these two different cervical dilatations.

A prospective longitudinal study was published from India in 2020 regarding changing trends in cervical dilation lengths at active phase of labor. It was revealed that in most of the cases it starts at 6 cm and if intervention is made prior to this, it may result in prolonged labor.<sup>18</sup> We studied around 600 women and our results showed that there was no Significant difference in any of the maternal or fetal parameters studied at 4 cm and 6 cm dilatation.

## LIMITATIONS OF STUDY

Maternal and perinatal outcome are multidimensional entities and multiple mother related, fetus related and medical facility related factors could impact them. Strictly controlling confounding factors for outcome parameters could generate results which could relate outcome parameters directly to Amniotomy at different cervical dilatations. Moreover, NICU stay could also be dependent on neonatologist dealing at the unit and different specialists may have different approach regarding discharge of patients from NICU.

## CONCLUSION

Induction of labor via Amniotomy could be done effectively both at 4 cm and 6 cm cervical dilatation. Both maternal and perinatal outcome parameters were not significantly different in women undergoing Amniotomy at these two different cervical dilatations in our study.

**Conflict of Interest:** None.

**Funding Source:** None.

## Authors Contribution

Following authors have made substantial contributions to the manuscript as under:

ST & TY: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

## REFERENCES

1. Al-Wassia H, Saber M. Admission of term infants to the neonatal intensive care unit in a Saudi tertiary teaching hospital: cumulative incidence and risk factors. *Ann Saudi Med* 2017; 37(6): 420-424.  
<https://doi.org/10.5144/0256-4947.2017.420>
2. Tang J, Gou W, Fu Y, Li K, Guo X, Huang T, et al. Association between postterm pregnancy and adverse growth outcomes in preschool-age children. *Am J Clin Nutr* 2022; 116(2): 482-490.  
<https://doi.org/10.1093/ajcn/nqac127>
3. Modrzyńska A, Radoń-Pokracka M, Plonka M. Labor induction at full-term and post-term pregnancies. *Folia Med Cracov* 2019; 59(4): 79-94. <https://doi.org/10.24425/fmc.2019.131382>
4. Middleton P, Shepherd E, Morris J, Crowther CA, Gomersall JC. Induction of labour at or beyond 37 weeks' gestation. *Cochrane Database Syst Rev* 2020; 7(7): CD004945.  
<https://doi.org/10.1002/14651858.CD004945.pub5>
5. Carlson N, Ellis J, Page K, Dunn Amore A, Phillippi J. Review of Evidence-Based Methods for Successful Labor Induction. *J Midwifery Womens Health* 2021; 66(4): 459-469.  
<https://doi.org/10.1111/jmwh.13238>
6. Wennerholm UB, Saltvedt S, Wessberg A, Alkmark M, Bergh C, Wendel SB, et al. Induction of labour at 41 weeks versus expectant management and induction of labour at 42 weeks (SWEdish Post-term Induction Study, SWEPIIS): multicentre, open label, randomised, superiority trial. *BMJ* 2019; 367(3): l6131. <https://doi.org/10.1136/bmj.l6131>
7. Kehila M, Abouda HS, Sahbi K, Cheour H, Chanoufi MB. Ultrasound cervical length measurement in prediction of labor induction outcome. *J Neonatal Perinatal Med* 2016; 9(2): 127-131.  
<https://doi.org/10.3233/NPM-16915111>
8. Pereira S, Frick AP, Poon LC, Zamprakou A, Nicolaides KH. Successful induction of labor: prediction by preinduction cervical length, angle of progression and cervical elastography. *Ultrasound Obstet Gynecol* 2014; 44(4): 468-475.  
<https://doi.org/10.1002/uog.13411>
9. Rane SM, Guirgis RR, Higgins B, Nicolaides KH. Models for the prediction of successful induction of labor based on pre-induction sonographic measurement of cervical length. *J Matern Fetal Neonatal Med* 2005; 17(5): 315-322.  
<https://doi.org/10.1080/14767050500127690>
10. Iftakhar T, Qazi N, Malik N, Hamid N, Gul N, Rauf R. Prediction of Successful Induction of Labour jointly using Bishop Score and Transvaginal Sonography in Primigravida Women in Pakistan. *Ann Pak Inst Med Sci*. 2023; 19(2): 134-137.
11. Li PC, Tsui WL, Ding DC. The Association between Cervical Length and Successful Labor Induction: A Retrospective Cohort Study. *Int J Environ Res Public Health* 2023; 20(2): 1138.  
<https://doi.org/10.3390/ijerph20021138>
12. Araújo NM, Ochiai AM, Camargo JDCS, Ussame EY, Osava RH, Silva LCFPD. Cervical dilation assessment in simulators compared to a visual tool: A randomized study. *Rev Lat Am Enfermagem* 2023; 31(3): e3881.  
<https://doi.org/10.1590/1518-8345.6102.3881>
13. Thiele CE, Beckmann M. Induction of labour involving an amniotomy: Waiting compared to immediate oxytocin. *Aust N Z J Obstet Gynaecol* 2022; 62(5): 795-799.  
<https://doi.org/10.1111/ajo.13544>
14. Njie AE, Nyandiko WM, Ahoya PA, Moutchia JS. A comparative analysis of APGAR score and the gold standard in the diagnosis of birth asphyxia at a tertiary health facility in Kenya. *PLoS One* 2023; 18(5): e0285828.  
<https://doi.org/10.1371/journal.pone.0285828>
15. Li PC, Tsui WL, Ding DC. The Association between Cervical Length and Successful Labor Induction: A Retrospective Cohort Study. *Int J Environ Res Public Health* 2023; 20(2): 1138.  
<https://doi.org/10.3390/ijerph20021138>
16. Mohd Fathil N, Abd Rahman R, Mohd Nawi A, Kamisan Atan I, Kalok AH, Mohamed Ismail NA, et al. Comparison of Pregnancy Outcome between 4 and 6 cm Cervical os Dilatation to Demarcate Active Phase of Labour: A Cross-Sectional Study. *J Pregnancy* 2023; 2023: 8243058.  
<https://doi.org/10.1155/2023/8243058>
17. Rosli AA, Nawi AM, Atan IK, Kalok AM, Ahmad S, Ismail NAM, et al. Cervical dilatation at diagnosis of active phase of labour determines the mode of delivery and peripartum outcomes: a retrospective study in a single tertiary centre in Malaysia. *BMC Pregnancy Childbirth* 2023; 23(1): 221.  
<https://doi.org/10.1186/s12884-023-05523-7>
18. Shukla D, Shukla S, Patel S, Shah A. Changing Trends in Rate of Cervical Dilation in First Stage of Labor: Prospective Longitudinal Study. *Open J Obstet Gynecol* 2020; 10(9): 176-186.  
<https://doi.org/10.4236/ojog.2020.1090111>