International Journal of Reproduction, Contraception, Obstetrics and Gynecology
*Kumar L et al. Int J Reprod Contracept Obstet Gynecol. 2025 Jun;14(6):1750-1753*
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20251428

**Original Research Article**

# Prediction of preterm labor using ultrasound measurement of cervical length at 11 to 14 weeks and 18 to 20 weeks

**Laxman Kumar*, Chand Ughareja, Darshit Tailor**

Department of Obstetrics and Gynaecology, Pacific Institute of Medical Science, Udaipur, Rajasthan, India

**Received:** 20 April 2025
**Revised:** 04 May 2025
**Accepted:** 05 May 2025

***Correspondence:**
Dr. Laxman Kumar,
E-mail: l.prajapati1993@gmail.com



## ABSTRACT

**Background:** Preterm birth (PTB) is the most important problems that pose dilemmas for both the obstetrician and neonatologist, as it is the leading cause of perinatal morbidity and mortality around the world. Routine cervical length screening during early pregnancy can predict PTB. Objectives were to predict the PTB with the use of ultrasonographic cervical length measurement at 11-14 weeks and 18-20 weeks of gestation.
**Methods:** This prospective observational study was conducted from 1st March 2024 till 31st March 2024 at department of obstetrics and gynaecology pacific institute of medical science Udaipur. Total 100 cases selected which are routinely advised for ultrasound during antenatal checkup at 11-14 weeks and 18-20 weeks. In this study all the analysis was performed using 10.0 version of statistical software SPSS.
**Results:** In this study most women (49.0%) belonged to the age group of 26-30 years. 78.0% of women had term births and 22.0% of women had PTBs. It was observed that 12 women had cervical length <25 mm at 18-20 weeks and 83% of them had PTBs while 16.6% had term birth.
**Conclusions:** Ultrasound measurement of cervical length in early pregnancy is a reliable and cost-effective method for screening of PTB. We observed that women with shorter cervix early on in pregnancy had a greater number of PTB s as compared to women with normal length of cervix.

**Keywords:** Preterm birth, Ultrasonography, Cervical length

## INTRODUCTION

According to world health organization PTB defined as birth between 20 and 36+6/7 weeks. PTB can follow preterm labour (50%) or preterm premature rupture of membranes (30%) or can be spontaneous.[1]

Worldwide, 15 million babies are born preterm every year, causing 1.1 million deaths, as well as short- and long-term morbidity in major group of survivors.[2] Preterm neonates generally encounter many short-term complications due to immaturity of multiple organ systems and others likes neurodevelopmental disorders such as cerebral palsy, intellectual disabilities, and the vision, hearing impairments.[3,4]

There are many methods which are used to predict preterm delivery (PTD) in women presenting with preterm labor (PTL) including digital examination, fetal fibronectin, and several biomarkers, but all these have limited predictive ability as compared to cervical length assessment during antenatal period.[5-9]

Evaluation of the cervix has been used as a tool to predict PTB based on the concept that the cervix acts as an anatomic marker of the underlying pathologic process which can leads to preterm delivery.

The risk of spontaneous PTB is inversely proportional to the length of the cervix; those with the shortest CL have the highest risk of prematurity.

Cervical length assessment generally advised and performed as routine in early and mid-trimester ultrasound examination as part of nuchal translucency and nasal bone scanning and during anomaly scan. Cervical length assessment found as cost-effective methods by many studies but it is influenced by many local characteristics.[10,11]

Transvaginal ultrasound is considered the 'gold standard 'measurement when assessing cervical length. In contrast to transabdominal ultrasound, transvaginal ultrasound measurements are very precise, accurate, and generally measurements are unaffected by maternal obesity, cervical position, pathology and shadowing from fetal parts.[12-14]

## METHODS

This study designed as a prospective observational study, conducted from 1th March 2024 to 31st March 2024. All patient registered at department of obstetrics and gynaecology, pacific institute of medical science Udaipur for antenatal checkup and advised for routine ultrasonography at 11 to 14 weeks and 18 to 20 weeks. 100 cases selected according to eligibility. The confidentiality of all data was strictly maintained.

Sample size calculated by the following formula:

$n=Z^2P(1-P)/d^2$

Where n=sample size, Z=Z statistic for level of confidence (1.96 for 95% confidence level), p=expected prevalence or proportion, and d=precision.[15] In India prevalence of PTB is 18%.[16] Level of precision used is 0.07. After subtracting almost 10% dropout 100 as sample size taken.

Cervical length measured by radiologist by transvaginal ultrasound. To avoid erroneous cervical measurement, each examination was carried out while the patient was in the lithotomy position and had an empty bladder. A vaginal probe introduced and sagittal segment of uterine and cervix localized. The length of cervix measured as distance between internal and external cervical OS.

### *Inclusion criteria*

Singleton pregnancy, all antenatal cases including patients conceiving through assisted reproductive methods, all willing to participate were included.

### *Exclusion criteria*

Patients with history of cerclage in previous pregnancy, cervical pathologies and multiple gestations were excluded.

### *Statistical analysis*

In this study all the analysis was performed using 10.0 version of statistical software SPSS. Continuous variables have been summarized by using summary statistics (number of observations, mean and standard deviation) and categorical values by using frequencies and percentages in both the groups.

For all study cases descriptive statistics have been estimated and presented in tables to know the overall profile.

Data collected for age, cervical length, gestational period are presented as counts and percentages and the outcome of pregnancy was analysed using chi square test. SPSS version 15.1 was used for analysis.

## RESULTS

According to this study, 49.0% cases belong to age group of 26-30 years followed by 30.0% cases were in age group of 20-25 years and 20.0% cases had age group of 31-35 years (Table 1).

As per this profile, 78.0% of women had Term delivery and 22.0% of women had preterm delivery (Table 2).

At >37 weeks of gestation, mean cervical length was 4.02 cm among 11-14 weeks which was significantly more as compared to 3.43 cm among 18-20 weeks (Table 3).

Women who had a reduction in cervical length >1 cm between 11-14 weeks and 18-20 weeks scan had 71.4% PTB and 28.5% had term birth. Majority of the women had a reduction in cervical length between 0.5 cm to 1 cm and 82.4% of them had term births while 17.5% had PTB (Table 4).

Among the women who had term birth-97.4% had cervical length >25 mm and 2.6% had cervical length <25 mm.

Among the women who had PTB 54.5% had cervical length >25 mm and 45.5% had cervical length <25 mm which is statistically significant (Table 5).

**Table 1: Profile of age distribution among study cases, (n=100).**

| Age groups (in years) | N | Percentage (%) |
|---|---|---|
| **20-25** | 30 | 30.0 |
| **26-30** | 49 | 49.0 |
| **31-35** | 20 | 20.0 |
| **36-40** | 01 | 01.0 |

**Table 2: Profile of delivery outcome, (n=100).**

| Maturity | No. of pregnant women | Percentage (%) |
|---|---|---|
| **Term (>37 weeks)** | 78 | 78.0 |
| **Preterm (<37 weeks)** | 22 | 22.0 |

**Table 3: Association between pregnancy outcome and mean cervical length.**

| Gestational period (weeks) | N | Mean cervical length (cm) | | P value |
|---|---|---|---|---|
| | | 11-14 weeks | 18-20 weeks | |
| **Term (>37 weeks)** | 78 | 4.02±0.30 | 3.43±0.31 | 0.001 |
| **Moderate preterm to late preterm (34 to 36 weeks+6 days) (32 to 33 weeks+6 days)** | 22 | 3.39±0.75 | 2.56±0.89 | 0.002 |

**Table 4: Association between pregnancy outcome and reduction in cervical length between 11-14 weeks and 18-20 weeks.**

| Reduction in cervical length | N | Pregnancy outcome | | | |
|---|---|---|---|---|---|
| | | Term | | Preterm | |
| | | N | % | N | % |
| **>1 cm** | 7 | 2 | 28.5 | 5 | 71.4 |
| **0.5 cm-1 cm** | 74 | 61 | 82.4 | 13 | 17.5 |
| **<0.5 cm** | 19 | 15 | 78.9 | 4 | 21 |

**Table 5: Association of cervical length and pregnancy outcomes.**

| Cervical length | | Term/preterm | | Total |
|---|---|---|---|---|
| | | Term | Preterm | |
| **>25 mm** | N | 76 | 12 | 88 |
| | % | 97.4 | 54.5 | 88 |
| **<25 mm** | N | 2 | 10 | 12 |
| | % | 2.6 | 45.5 | 12 |
| **Total** | N | 78 | 22 | 100 |
| | % | 100 | 100 | 100 |
| **P value** | | | | <0.001* |

*Significant at 0.05 level using fisher exact t test.

## DISCUSSION

Sonography is an integral part of pregnancy and it gives ample information to the obstetrician for understanding the wellbeing of both the mother and the baby. In our study we have used sonography to measure cervical length and understand its relation with PTB.

In our study we have studied the cervical lengths during the 11-14 weeks NT (nuchal translucency) scan and 18-22 weeks scan for anomalies. We have attempted to establish a relation between the cervical length values and the outcome of pregnancy.

We found a higher rate of preterm pregnancy in women with short cervical length i.e. <25 mm at 18-20 weeks. In our study we have seen a majority (49%) of women to be in age of 26-30 years.

Wadhawan et al enrolled 100 women of which 53% were in the age group of 21-25 years.[17]

Kore et al enrolled 115 women in which majority of them were in the age group of 20-30 years.[18] Raval et al have studied 150 women of which 46% belong to the range of 21-25.[19] Wadhawan et al studied the change in cervical length among two scans and grouped women according to the changes in cervical length and calculated the pregnancy outcomes, they reported 100% term births when the reduction in length was <0.5-1 cm and 9% PTBs and 90% term births when the reduction in length was 0.5-1 cm and 100% PTBs when the reduction was >1 cm.[17]

In our study we observed that women majority of women had a reduction in cervical length between 0.5-1 cm which is similar to the other study, similarly in this group the percentage of PTB was 17.5% and percentage of term birth was 82.4% which is comparable to 90% seen in the study by Wadhawan et al. Wadhawan et al reported 12% PTBs and 88% term deliveries among subjects.[17]

Priyadarshani et al divide 100 antenatal women into a study group with CL <25 mm and a control group with CL>25 mm, in their study among the study group 50% women had PTBs and 50% of them had term births.[20]

Ho et al observed that 60.8% of antenatal women had PTB i.e. <37 weeks, 33.8% women had births <34 weeks and 19.8% women had births at <31 weeks.[21]

Raval et al noted that 82.6% women with a cervical length less than 25 mm had PTBs and 17.14% of the women had term births. Hebbar et al found that 7.7% women delivered preterm and 6% delivered at term.[22]

Present study among 100 women were screened at 11-14 weeks, 3 had a cervical length <25 mm and all of them had a PTB with average gestational age being 33.4 weeks and among the women at 18-20 weeks, 12 of them had a cervical length <25 mm out of which 16.6% delivered at term with average gestational age being 38.4 weeks and 83.3% delivered preterm with average gestational age being 34.7 weeks.

### *Limitations*

In present study patient with previous history of any cervical pathology or cervical surgeries, multiple pregnancy, history of PTB not included which may affect the outcomes and results.

## CONCLUSION

Cervical length screening by trans vaginal ultrasound during early in pregnancy is a reliable and cost-effective method to diagnose women who are at risk for pre term delivery. According to present study, there is significantly

higher incidence of preterm birth in women with cervical length <25 mm even as early as 18-20 weeks. Women who had a reduction in cervical length >1 cm between 11-14 weeks and 18-20 weeks scan had greater percentage of preterm birth which was 71.4%. Timely intervention like cervical cerclage, progesterone supplement, life style modification can reduce incidence of preterm birth and related complication like neonatal mortality and morbidity.

## ACKNOWLEDGEMENTS

Authors would like to thank to Professor Dr. Pradeep Bhatnagar for guidance, feedback and support.

*Funding: No funding sources*
*Conflict of interest: None declared*
*Ethical approval: The study was approved by the Institutional Ethics Committee*

## REFERENCES

1. Berghella V, Saccone G. Cervical assessment by ultrasound for preventing preterm delivery. Cochrane Database Syst Rev. 2019;9(9):CD007235.
2. World Health Organization Fact Sheet #363. 2014. Available at: http://www.who.int/mediacentre/factsheets/fs363/en/. Accessed on 16 March 2025.
3. Kiss H, Petricevic L, Husslein P. Prospective randomised controlled trial of an infection screening programme to reduce the rate of preterm delivery. BMJ. 2004;329(7462):371.
4. McGregor JA, French JI. Pathogenesis to treatment: preventing preterm birth mediated by infection. Infect Dis Obstet Gynecol. 1997;5(2):106-14.
5. Mateus J, Pereira L, Baxter J, Berghella V, Tolosa J. Effectiveness of fetal fibronectin testing compared with digital cervical assessment of women with preterm contractions. Am J Perinatol. 2007;24(6):381-5.
6. Reiter E, Nielsen KA, Fedder J. Digital examination and transvaginal scan-competing or complementary for predicting preterm birth? Acta Obstet Gynecol Scand. 2012;91(4):428-38.
7. Crane JM, Van den Hof M, Armson BA, Liston R. Transvaginal ultrasound in the prediction of preterm delivery: singleton and twin gestations. Obstet Gynecol. 1997;90(3):357-63.
8. Andersen HF. Use of fetal fibronectin in women at risk for preterm delivery. Clin Obstet Gynecol. 2000;43(4):746-58.
9. Kashanian M, Bahasadri S, Ghasemi A, Bathaee S. Value of serum urocortin concentration in the prediction of preterm birth. J Obstet Gynaecol Res. 2013;39:26-30.
10. Preterm birth. Available at: https://www.who.int/news-room/fact-sheets/detail/preterm-birth. Accessed on 27 April 2025.
11. Werner EF, Hamel MS, Orzechowski K, Berghella V, Thung SF. Cost-effectiveness of transvaginal ultrasound cervical length screening in singletons without a prior preterm birth: an update. Am J Obstet Gynecol. 2015;213(4):554.e1-6.
12. Berghella V, Bega G, Tolosa JE, Berghella M. Ultrasound assessment of the cervix. Clin Obstet Gynecol. 2003;46(4):947-62.
13. Hassan SS, Romero R, Berry SM, Dang K, Blackwell SC, Treadwell MC, et al. Patients with an ultrasonographic cervical length < or =15 mm has nearly a 50% risk of early spontaneous preterm delivery. Am J Obstet Gynecol. 2000;182(6):1458-67.
14. Committee on Practice Bulletins-Obstetrics, The American College of Obstetricians and Gynaecologists. Practice bulletin no. 130: prediction and prevention of preterm birth. Obstet Gynecol. 2012;120(4):964-73.
15. Daniel WW, Cross CL. Biostatistics: A foundation for analysis in the health sciences. 10th ed. New York: John Wiley and Sons. 2013.
16. Jana A. Correlates of low birth weight and preterm birth in India. PLoS One. 2023;18(8):e0287919.
17. Wadhawan UT, Shah NP, Patil AN. Prediction of preterm labour by cervical length. Int J Reprod Contracept Obstet Gynecol. 2017;6(7):2978-82.
18. Kore SJ. Prediction of risk of preterm delivery by cervical assessment by transvaginal ultrasonography. Group. 2009;28:28-32.
19. Raval BM, Sisodiya VP, Yadava PA, Mehta ST, Patel SR, Dadhania BH. Measurement of cervical length using transvaginal sonography for prediction of preterm labour. Int J Reprod Contracept Obstet Gynecol. 2020;9(11):4471-6.
20. Priyadarshani P, Kaur G. Predicting preterm labour by cervical length measurement. Int J Reprod Contracept Obstet Gynecol. 2017;5(6):1809-13.
21. Ho N, Liu C, Nguyen A, Lehner C, Amoako A, Sekar R. Prediction of time of delivery using cervical length measurement in women with threatened preterm labor. J Matern Fetal Neonatal Med. 2021;34(16):2649-54.
22. Hebbar S, Samjhana K. Role of mid-trimester transvaginal cervical ultrasound in prediction of preterm delivery. Med J Malaysia. 2006;61(3):307-11.

**Cite this article as:** Kumar L, Ughareja C, Tailor D. Prediction of preterm labor using ultrasound measurement of cervical length at 11 to 14 weeks and 18 to 20 weeks. Int J Reprod Contracept Obstet Gynecol 2025;14:1750-3.