

# Transvaginal Sonographic Measurement of Cervical Length during Midtrimester in Predicting Preterm Labor in Asymptomatic Singleton Pregnancies

Mahalakshmi Aravazhi<sup>1</sup>, Madhumitha Chandrasekaran<sup>2</sup>, Deepak Chandrasekaran<sup>3</sup>

<sup>1</sup>Senior Assistant Professor, Department of Obstetrics and Gynaecology, Government Theni Medical College, Theni, Tamil Nadu, India, <sup>2</sup>Junior Resident, Department of Obstetrics and Gynecology, Government Theni Medical College, Theni, Tamil Nadu, India, <sup>3</sup>Department of Obstetrics and Gynaecology, Peregrine Cancer Cure Technologies, Bangalore, Karnataka, India

## Abstract

**Introduction:** Preterm delivery is a significant obstetric problem worldwide due to various complications in the newborn in its neonatal period and throughout lifetime. Cervical length is considered as a definitive predictor of preterm labor. Transvaginal sonography (TVS) can detect cervical length shortening earlier and more accurately than digital assessment. Based on this idea, this study is being undertaken to assess the bearing of cervical length measured by TVS at 18–24 weeks gestation on the outcome of pregnancy.

**Aims:** The aims are as follows: (1) To establish the relationship between cervical length at mid-trimester in uncomplicated singleton pregnancies and time of delivery, (2) To assess the potential value of routine cervical length measurement in singleton pregnancy between 18 and 24 weeks in the prediction of risk for early spontaneous preterm delivery

**Materials and Methods:** Study design: This was a prospective case–control study, (1) Study period: The study period was from July 2016 to December 2017 (18 months), (2) Place of study: The study was conducted at the Department of Obstetrics and Gynecology, GTMCH, (3) Study population: All booked cases between 18 and 24 weeks of gestation attending GTMCH who are willing to participate in the study, (4) Sample size: The sample size was 200. Inclusion criteria: All singleton pregnancies who have correct dates (reliable LMP in the background of the regular menstrual cycle [or] ultrasonography dating in the 1<sup>st</sup> trimester), between 18 and 24 weeks of gestation. Exclusion criteria: Not willing to participate in the study, multiple gestation, polyhydramnios, iatrogenic termination of pregnancy, and patients who missed follow-up.

**Results:** Out of 200 antenatal women upon whom the study was conducted, majority were multigravida which accounts to 79.59%. Out of 200 patients studied, 41 cases had short cervix which constitutes 20.5% of the population and Out of 41 patients with cervical length less than 25mm, around 25 patients delivered preterm. There were 28 NICU admissions out of 43 preterm deliveries. There were 28 NICU admissions of 43 preterm deliveries.

**Conclusion:** Preterm delivery and its effect on perinatal and neonatal morbidity and mortality is a global issue which needs significant attention among health-care personnel. Transvaginal sonographic determination of cervical length in women with asymptomatic singleton pregnancy is both cost-effective and has good validity as an effective screening test.

**Key words:** Antenatal, Cervical Length, Preterm, Short Cervix

## INTRODUCTION

Preterm birth is defined as birth between the age of viability and 37 completed weeks of gestation. Incidence of preterm birth ranges between 5% and 21% in India.

Preterm birth is the leading cause of perinatal mortality and morbidity worldwide. As compared to term babies, premature babies have increased morbidity due to organ system immaturity. Preterm birth contributes 75% of neonatal death based on observations worldwide, genital and urinary tract infections, and cervical insufficiency plays a major role in the occurrence of spontaneous preterm labor.

Numerous clinical and biochemical tests were studied for the prediction of preterm labor including patient demographics, cervical length measurement, fetal

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**Corresponding author:** Madhumitha Chandrasekaran, Junior Resident, Department of Obstetrics and Gynecology, Government Theni Medical College, Theni, Tamil Nadu, India. E-mail: itzdrmadhu@gmail.com

fibronectin tests, and microbial screening. Transvaginal sonographic measurement of cervical length is the best available method in the prediction of spontaneous preterm birth.

### Aim and Objectives

The objectives are as follows:

1. To determine cervical length by transvaginal sonography in asymptomatic singleton pregnancies between 18 and 26 weeks of gestation.
2. To establish the relationship between cervical length measured at mid-trimester and their time of delivery.
3. To assess the potential value of routine cervical length measurement in singleton pregnancy between 18 and 26 weeks in the prediction of risk for preterm delivery.

### MATERIALS AND METHODS

- Study design: This was a prospective observational study
- Study place: The study was conducted at Government Theni Medical College and Hospital
- Sample size: The sample size was 200.

### Inclusion Criteria

The following criteria were included in the study:

1. Asymptomatic antenatal women between 18 and 26 weeks gestation who have registered before 16 weeks of gestation with known LMP.
2. Antenatal women between 18 and 26 weeks gestation with one of the following high-risk factors:
  - History of threatened abortion in present pregnancy
  - Previous first-trimester abortions
  - Previous second-trimester abortion
  - History of preterm birth is included
  - Second gravida with an interpregnancy interval of <1 and hour years or more than 5 years
  - Evidence of infections like urinary tract infections/ bacterial vaginosis/periodontal disease

### Exclusion Criteria

The following criteria were excluded from the study:

1. Multiple pregnancy
2. Congenital fetal anomaly
3. Polyhydramnios
4. Iatrogenic preterm birth due to severe preeclampsia, intrauterine fetal growth restriction, etc.
5. Patients who did not come for follow-up at GTMCH.

### Methodology

The patients coming under inclusion criteria are explained about the study and consent for the same obtained. Using

transvaginal ultrasound, cervical length is measured, and they are asked to come for follow-up after 3–4 weeks. If cervical length is more than 25 mm, these patients are not subjected to further follow-up scan and their gestation age at delivery and mode of delivery are noted. If the length is <25 mm, follow-up scan up to 28 weeks is done, and the patients are followed up until delivery.

### RESULTS

Among these 200 study population, 100 were without any high-risk factors for preterm delivery, and 100 were with high-risk factors for the same. Of 200 antenatal women, majority were multigravida which accounts to 79.59% and primigravida were accounting to 20.59% [Table 1].

Of 200 cases, 21.5% delivered before 37 weeks of gestation and 78.5% delivered at term [Table 2] of 41 primigravidas, 9 mothers delivered preterm babies whereas 32 mothers delivered term babies. Among 159 multigravidas, 34 delivered preterm and 125 delivered term [Table 3]. Of 200 study population, 96 were belonging to 21–24 years age group [Table 4] about 8 deliveries of 12 in teenage pregnancies resulted in preterm delivery (66.67%) followed by 23.95% and 23.07% in 21–24 and 25–29 age groups, respectively. Only 12.5% of the deliveries were preterm in women more than 35 years of age [Table 5].

Out of 200 patients studied, 41 cases had short cervix which constitutes 20.5% of the population, and 159 patients had cervical length more than 25 mm (79.5%) [Table 6].

**Table 1: Distribution of study population based on parity (n=200)**

Parity	n (%)
Primigravida	41 (20.5)
Multigravida	159 (79.5)

**Table 2: Distribution of study population based on gestational age at delivery (n=200)**

Gestational age	n (%)
Preterm	43 (21.5)
Term	157 (78.5)

**Table 3: Relationship between parity and gestational age at delivery (n=100)**

Parity	Preterm	Term
Primigravida	9	32
Multigravida	34	125
Total	43	157

Of 41 patients with cervical length <25 mm, around 25 patients delivered preterm and 14 patients out of 32 who had cervical length between 26 and 30 mm delivered preterm [Table 6].

In Table 7, the number of patients with a short cervix and their outcome versus number of patients with cervical length of more than 25 mm and their pregnancy outcome were given. The results showed that the sensitivity of this test is 58% and specificity is 89%. The efficiency of the test is 83%, and positive predictive value is 60%, negative predictive value is 89%, false positive rate is 10%, and false negative rate is 42%, Kappa agreement is moderate agreement. The mean cervical length is 32.35 mm, and standard deviation is 6.83. The mean gestational age at delivery is 38.28 weeks, and standard deviation is 2.03 (Tables 7a and 7b). P value of transvaginal ultrasound measurement of cervical length in the prediction of preterm labor in asymptomatic singleton pregnancy is 0.001 which is significant.

In Table 8, there were 28 NICU admissions of 43 preterm deliveries and 20 NICU admissions among 153 term babies [Table 8 and Charts 1-7].

**Table 4: Age distribution of study population (n=200)**

Age (years)	n (%)
<20	12 (6)
21-24	96 (48)
25-29	71 (35.5)
30-34	13 (6.5)
≥35	8 (4)

**Table 5: Distribution of study population based in age and its relationship to preterm delivery (n=200)**

Age (years)	n	Preterm	Percentage
≤20	12	8	66.67
21-24	96	23	23.95
25-29	71	8	11.26
30-34	13	3	23.07
≥35	8	1	12.5

**Table 6: Distribution of study population based on cervical length (mm) and gestational age at delivery (n=200)**

Cervix length (mm)	Number of cases	Preterm	Percentage
<25	41	25	60.97
26-30	32	14	43.75
31-35	43	2	4.65
36-40	70	2	2.85
>40	14	0	0

## DISCUSSION

In our study including 200 antenatal women, about 12 patients were less than 20 years old and 8 out of 12 teenage pregnancies resulted in preterm deliveries which constitutes 66.67% This result showing teenage pregnancy as an independent risk factor for preterm delivery is comparable to the study result conducted by Athena JMG Crane1 al, Mukherji *et al.*<sup>[5]</sup> which also establishes teenage as risk for preterm delivery.

In our study including 200 antenatal cases, 41 cases were identified to be having short cervix and 25 of them had preterm delivery which constitutes 60.97%. there is increased chance of preterm labour in patients having cervical length between 26 mm-30 mm which constitutes 43%. These results were comparable to the study conducted by Brien *et al.*<sup>[2]</sup> which also gives a positive association between short cervix and occurrence of preterm delivery.

**Table 7: Relationship between cervical length in mm and gestational age at delivery among study population (n=200)**

Cervical length (mm)	Preterm	Term	Total
<25	25 (a)	16 (b)	41
>25	18 (c)	141 (d)	159

**Table 7a: Statistical parameters**

Parameters	Estimate (%)	95% CI
Sensitivity	58	42-73
Specificity	89	84-94
Efficiency	83	77-88
False positive rate	10	6-17
False negative rate	42	27-58
Positive predictive value	60	44-76
Negative predictive value	89	83-93
Kappa agreement	κ=0.49	Moderate agreement

**Table 7b: Correlation of cervical length with gestational age at delivery**

Variables	Cervical length (mm)	Gestational age (weeks)
Mean	32.35	38.28
SD	6.38	2.03
P value	r=0.10<0.001 significant	

**Table 8: Gestational age versus NICU admission**

GA	Total	NICU admission
Preterm	43	28
Term	153	20

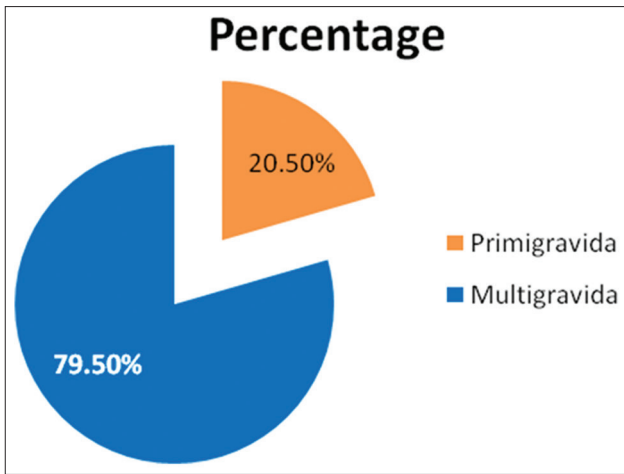


Chart 1: Distribution of study population based on parity

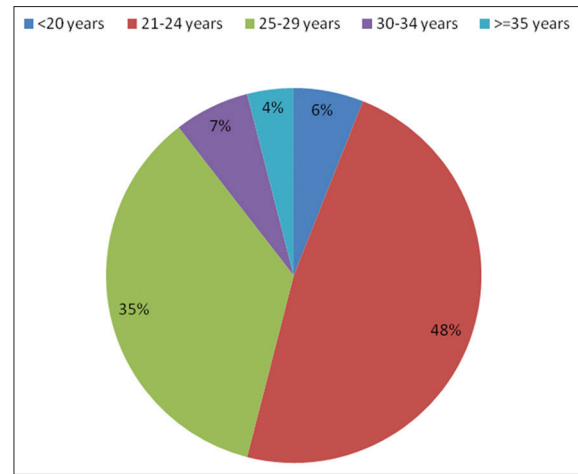


Chart 4: Age distribution of study population, n = 200

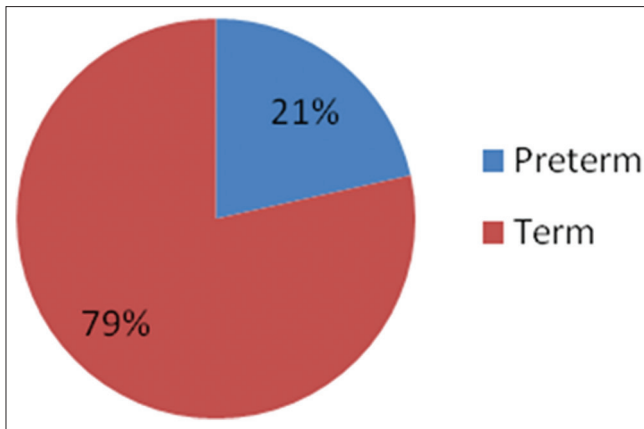


Chart 2: Distribution of study population based on gestational age at delivery. n=200

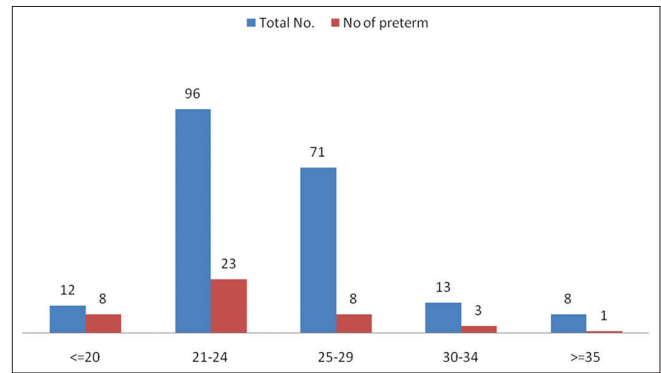


Chart 5: Distribution of study population based on age and relationship to preterm delivery

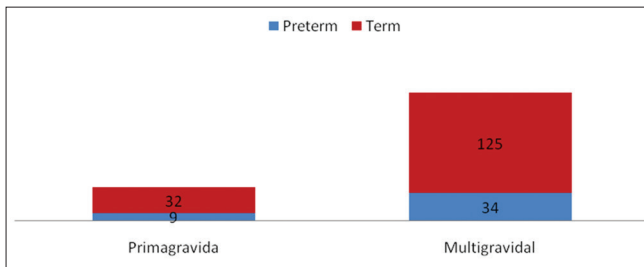


Chart 3: Relationship between parity and gestational age at delivery

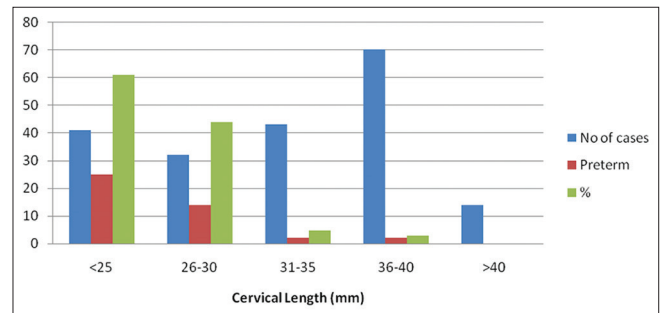
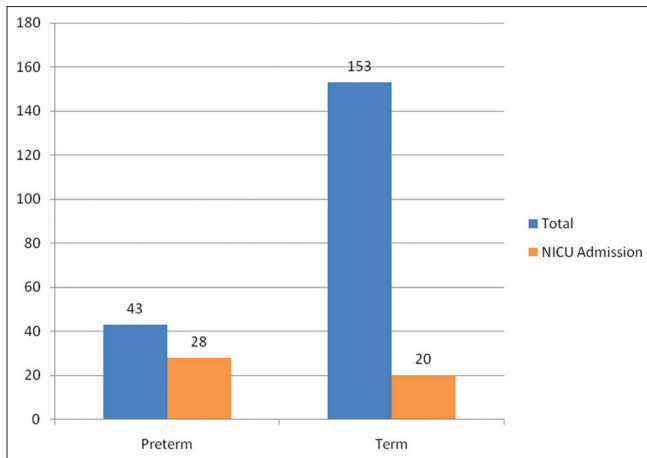


Chart 6: Cervical length (mm) versus gestational age at delivery

In asymptomatic women with singleton gestation, transvaginal measurement of cervical length with cut off of 25 mm has 58% sensitivity (present study) in predicting preterm labour (<37 weeks) which is comparable to study by Airoldi *et al.*<sup>[3]</sup>

Specificity of TVS measurement of cervical length with 25mm cutoff in predicting preterm labour in present study was 89% which was comparable to other studies like J. Visintine *et al.*<sup>[4]</sup>

Preterm delivery and its effect on perinatal and neonatal morbidity and mortality is a global issue which needs significant attention among health care personnel. prediction of preterm labour by suitable effective and reliable method is a boon to save innumerable young lives. By reducing preterm deliveries, we can manage huge economic ,medical and social burden on the country as well as the globe.



**Chart 7: Relationship between gestational age at delivery and NICU admission**

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