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Transvaginal Ultrasound Cervical Length For Prediction Of Spontaneous Labour At Term: A Cross-Sectional Study

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ABSTRACT

Background: *Prediction of spontaneous labor onset at term is crucial for optimal prenatal care and delivery planning. The Bishop score, a subjective method to assess cervical readiness, has limitations in reliability. Transvaginal ultrasound(TVS) provides a more objective and reproducible measurement of cervical length (CL), which may aid in predicting spontaneous labor and delivery outcomes.*

Objectives: *To determine cervical length among pregnant women at term using transvaginal ultrasonography and assess the relationship between cervical length and spontaneous labor.*

Methods: *This cross-sectional study included 200 term pregnant women with singleton cephalic presentation attending the Department of Obstetrics and Gynaecology, Sri Adichunchanagiri Hospital and Research Centre, B.G. Nagara, from May 2023 to November 2024. Cervical length was measured via TVS between 37 and 39 weeks of gestation. Participants were monitored for labor onset, mode of delivery, and neonatal outcomes.*

Results: *Among 200 women, 57% were primigravida and 43% multigravida. The mean cervical length was significantly longer in primigravida women(2.96±0.42cm) compared to multigravida women (2.79 ± 0.36 cm; p=0.0018).Women with sedentary occupational activity had longer cervical lengths (3.16 ± 0.50 cm) compared to those with heavy physical activity(2.68±0.36cm;p<0.001).The majority (73.5%) had full-term normal delivery, while 20.5% underwent cesarean section.*

Conclusion: *Transvaginal ultrasound measurement of cervical length is a valuable, objective tool for predicting spontaneous labor onset and mode of delivery at term. Parity and physical activity influence cervical length and should be considered in clinical assessments. Incorporation of cervical length measurement into routine prenatal care may improve labor management and neonatal outcomes.*

Key words: *Transvaginal ultrasonography, Cervical length, Spontaneous labor, Term preg- nancy, Bishop score*

INTRODUCTION

Vaginal delivery is the most important event occurring in women's life.[1] One of the most important issues in prenatal care is to determine the time of delivery. Being aware of delivery time has several potential benefits. Pregnant women could plan their social activities and get prepared for delivery. In addition, clinicians may be able to better manage term pregnancies.[2]

Assessment of cervix has been used as a predictor of the probability of vaginal delivery.[3] Laboring women either go into labor spontaneously or undergo induction of labor. Rates of induction of labor have been rising globally, with rates of 26% annually reported in the United States.[1] This required the development of a predictive method for a successful vaginal birth. The most common subjective method of evaluation of the cervix is the Bishop score. Dr. Edward Bishop developed this scoring system and recommended a score ≥ 9.[4] as an indicator of successful induction, which decreased to a score of 6, according to the American College of Obstetrics and gynecology.[1] Despite the wide application of Bishop scoring system ,some recent studies have question edit's reliability ,as the process of evolution may sometimes be subjective and different depending on physician's skills and experience.[5]

Transvaginal ultrasound it provides for greater quality and more precise vision of uterine cervix, transvaginal sonographic measuring of cervix isa reliable alternative approach for determing cervical length. Transvaginal ultrasound is a safe, accurate, and available tool in all obstetric units.[6] It has an essential predictive as well as a diagnostic role in patients presenting in preterm birth because the supravaginal portion of the cervix usually comprises about 50% of cervical length, but this is highly variable among individuals. This portion is difficult to assess digitally [3].It is also worth noting that all randomized trials suggesting the effectiveness of women with short cervix have been used by Transvaginal ultrasonography to assess cervical length.[7]Hence the present study is to assess the relationship between cervical length measurement by transvaginal sonography and mode of delivery in term pregnancy in a rural setup.

MATERIALS AND METHODS

Study Design and Setting:

A cross-sectional study conducted at the Department of Obstetrics and Gynaecology, Sri Adichunchanagiri Hospital and Research Centre, B.G. Nagara, Karnataka, India, from May 2023 to November 2024.

Participants:

Inclusion criteria were women with singleton term pregnancies (37-40 weeks), cephalic presentation, and previous normal delivery.

Exclusion criteria included multiple pregnancies, planned cesarean sections, active labor on presentation, History of cervical surgery or insufficiency,fetal growth abnormalities,and severe maternal conditions.

Sample Size and Sampling:

Convenient sampling of 200 women was done based on hospital statistics indicating 15% of term laboring women undergo TVS cervical length measurement.

Procedure:

After written informed consent, TVS was performed with an empty bladder using a Mindray DC-60 machine and a transvaginal probe. Cervical length was measured in the midsagittal plane from the internal to external os. Three measurements were taken, and the shortest was used for analysis.

Data Collection:

Demographic data, parity, occupational activity, comorbidities, duration of labor stages, mode of delivery, and neonatal outcomes including NICU admission and APGAR scores were recorded.

Statistical Analysis:

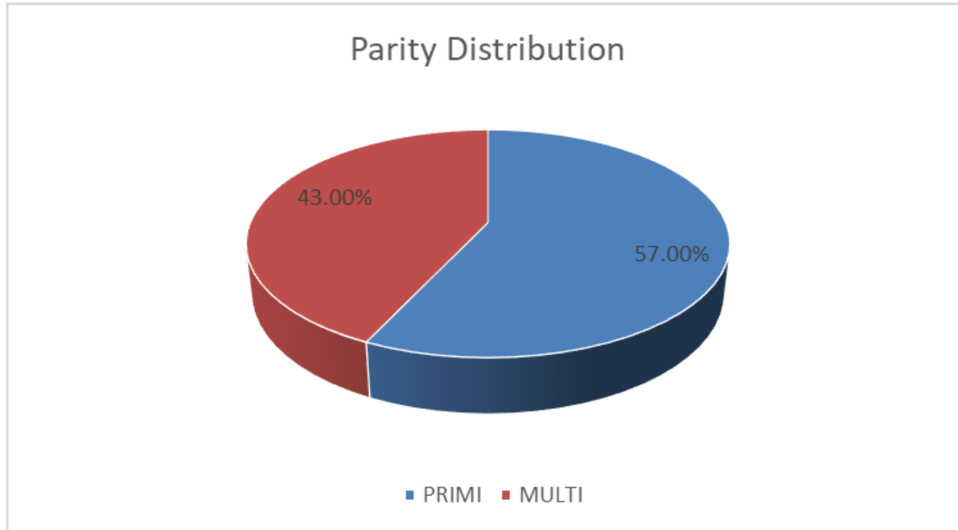
Data were analyzed using SPSS version20. Descriptive statistics were computed. Independent t-tests compared cervical length across parity and activity levels. Chi-square tests assessed categorical variables. A p-value <0.05 was considered statistically significant.

RESULTS

Comparsion based on Demographics and Parity:

Of 200 participants,114(57%) were primigravida and 86(43%)multigravida. The mean age was 24.39 years (±3.72).

Parity	Frequency	Percentage
PRIMI	114	57.00%
MULTI	86	43.00%
Total	200	100.00%

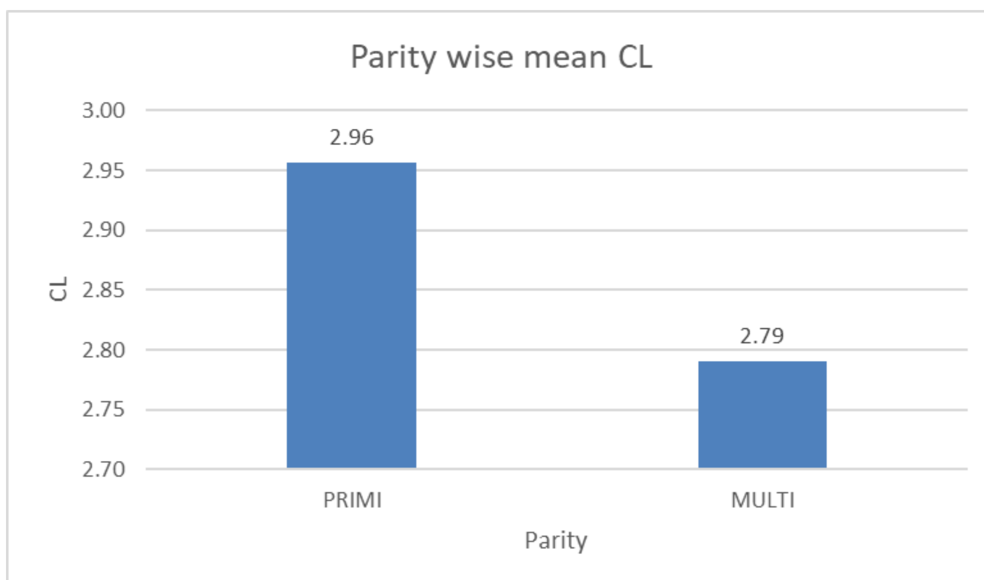


Graph 1: Distribution of Study Participants Based on Parity

Cervical Length:
Mean cervical length was 2.885cm(±0.40).Primigravida had significantly longer cervices (2.96 cm) than multigravida (2.79 cm; p=0.0018) [[26], [27]].

PARITY	CL		P-value
	Mean	S.D.	
PRIMI	2.96	0.42	0.0018
MULTI	2.79	0.36	

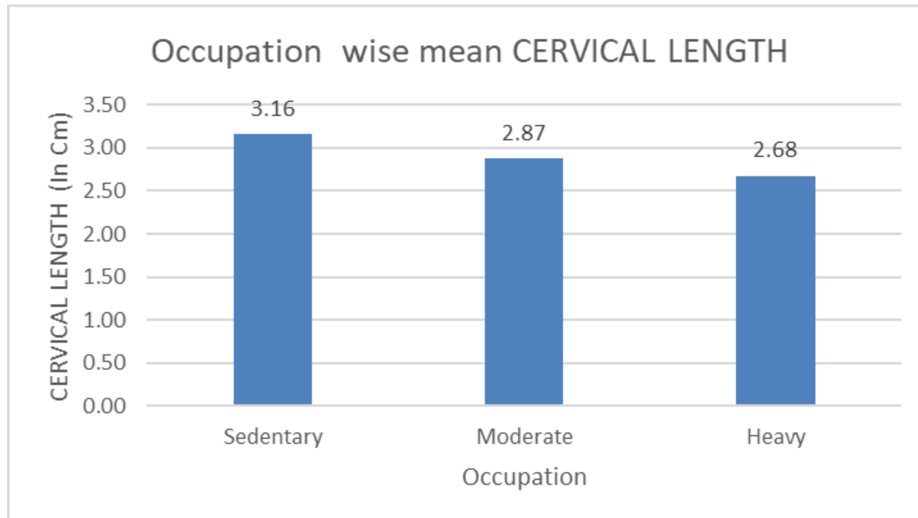
Comparison of Mean Cervical Length (CL) Based on Parity



Graph 2: Comparison of Mean Cervical Length (CL) Based on Parity

Comparison based on Occupational Activity:
Sedentary women had longer cervical length(3.16cm) than moderate(2.87cm) and heavy activity groups (2.68 cm; p<0.001) [[32]].

Occupation	CERVICAL LENGTH		P-value
	Mean	S.D.	
Sedentary	3.16	0.50	< 0.001
Moderate	2.87	0.37	
Heavy	2.68	0.36	



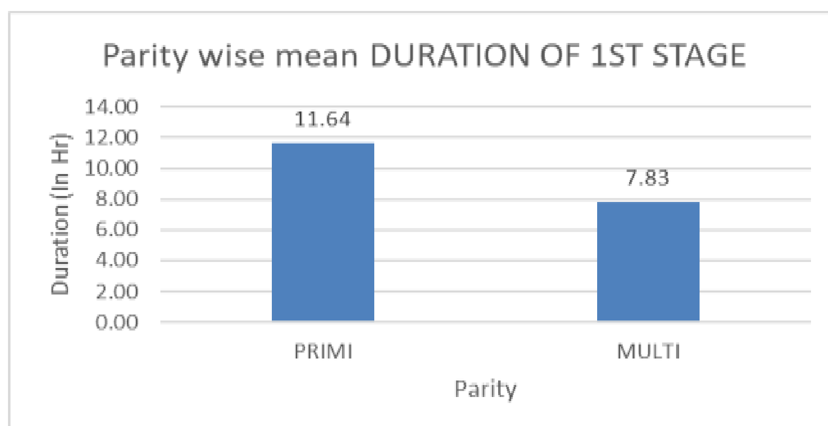
Graph 3: Comparison of Mean Cervical Length Based on Occupational Activity Level

Comparison based on Mode of Delivery:
147(73.5%) delivered vaginally, 41(20.5%) by cesarean section, and12 (6%)by vacuum-assisted delivery

OUTCOME	Frequency	Percentage
FTND	147	73.50%
LSCS	41	20.50%
VAVD	12	6.00%
Total	200	100.00%

Comparison based on Labor Duration:
Primigravida experienced longer second stage labor(41.6min) than multi- gravida (29.57 min; p<0.001).

PARITY	DURATION OF 1ST STAGE	
	Mean	S.D.
PRIMI	11.64	2.06
MULTI	7.83	2.78

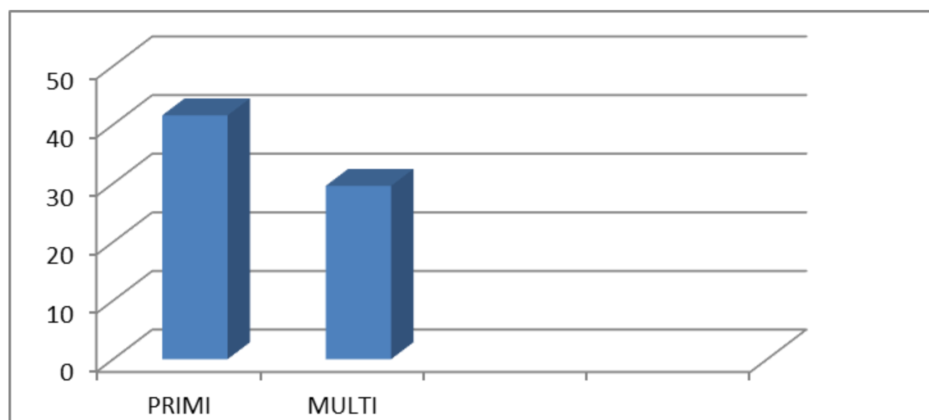


Graph 4: Comparison of Duration of First Stage of Labour Based on Parity

Comparison of Duration of Second Stage of Labour Based on Parity

The data indicate that primiparous women experience a significantly longer second stage of labor compared to multiparous women, with mean durations of 41.60 and 29.57, respectively. The very low p-value (7.63E-18) confirms that this difference is highly statistically significant, suggesting that parity plays an important role in the progression of labor during the second stage.

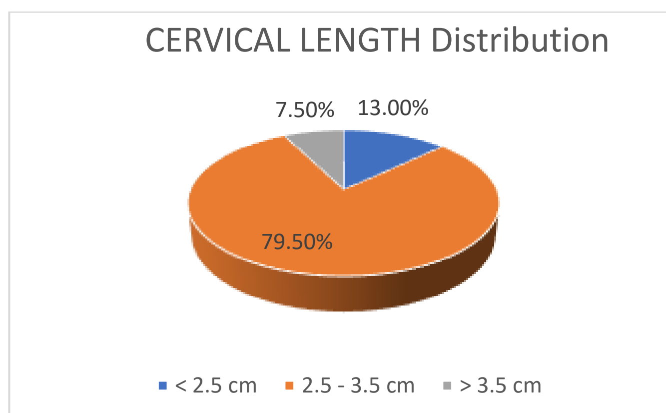
PARITY	DURATION OF 2nd STAGE		P-value
	Mean	S.D.	
MULTI	29.57	8.20	7.63E-18
PRIMI	41.60	7.55	



Graph 5: Comparison of Duration of Second Stage of Labour Based on Parity

Distribution of Study Participants Based on Cervical Length

CERVICAL LENGTH	Frequency	Percentage
< 2.5 cm	26	13.00%
2.5 - 3.5 cm	159	79.50%
> 3.5 cm	15	7.50%
Total	200	100.00%



Graph 6: Distribution of Study Participants Based on Cervical Length

DISCUSSION

This study confirms that transvaginal ultrasound cervical length measurement is a reliable predictor of spontaneous labor and mode of delivery at term . The longer cervical length in primigravida women may reflect

physiological differences due to parity [[11], [12]]. Physical activity inversely correlated with cervical length, suggesting lifestyle factors influence cervical ripening [12][13].
Shorter cervical lengths were linked to increased cesarean rates and NICU ad- missions, aligning with previous literature emphasizing the role of cervical assessment in labor management[[12],[14].Incorporating cervical length measurement could enhance risk stratification and optimize timing for interventions.

Limitations
The study was limited by its single-center design and reliance on a single operator for TVS measurements, which may introduce bias. The study did not assess biochemical markers or longitudinal cervical changes.

CONCLUSION
Transvaginal ultrasound measurement of cervical length is a valuable, non- invasive tool for predicting spontaneous labor and delivery outcomes at term. Parity and activity levels influence cervical length and should be considered. Routine integration of cervical length assessment into prenatal care can improve labor prediction and neonatal health.

Future Aspects
Future research should aim to refine the use of cervical length measurements by exploring its combination with other biomarkers, such as maternal serum levels of specific proteins or hormones, to create more accurate predictive models for labor onset. Longitudinal studies that follow women throughout pregnancy, from early gestation to labor, could offer deeper insights into how cervical changes evolve over time and their relationship to various clinical outcomes. Additionally, investigations into how interventions based on cervical length measurements (such as progesterone supplementation or cervical cerclage) affect labor outcomes could help optimize clinical management. Exploring the impact of different demographic and lifestyle factors on cervical length could further enhance the precision of labor prediction and improve individualized care for pregnant women.

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