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THE ROLE OF SECOND-TRIMESTER CERVICAL LENGTH IN PREDICTING PRETERM BIRTH

Obstetrics & Gynaecology

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ABSTRACT

Background: Preterm birth remains a leading global health challenge, contributing to significant neonatal morbidity and mortality. This study examines the role of second-trimester cervical length in predicting preterm delivery to optimize antenatal care, especially in resource-limited settings. **Aim:** To evaluate the predictive value of second-trimester cervical length for preterm birth and enhance antenatal care practices. Methods: Participants underwent clinical assessments, including cervical length measurement via transvaginal ultrasonography during the second trimester. Cervical lengths were categorized into ≤2.5 cm, 2.6–3.4 cm, or ≥3.5 cm. Pregnancy outcomes, including gestational age at delivery and mode of delivery, were monitored. Data were analyzed statistically to examine the association between cervical length and preterm birth. Ethical principles and clinical guidelines were strictly adhered to throughout the study. **Result:** Shorter cervical lengths (≤2.5 cm) were significantly associated with adverse pregnancy outcomes ($p = 0.049$), including higher rates of preterm vaginal deliveries and preterm LSCS. The mean gestational age differences across groups were not statistically significant ($p = 0.715$). These findings underscore the predictive value of cervical length in identifying pregnancies at risk for preterm delivery. **Conclusion:** Cervical length serves as a crucial predictor of pregnancy outcomes, especially preterm birth, aiding in timely clinical decision-making and interventions.

KEYWORDS

Cervical Length Preterm Birth Pregnancy Outcomes Transvaginal Ultrasound Antenatal Care

INTRODUCTION

Preterm birth remains a significant global health concern, contributing to substantial neonatal morbidity and mortality. Worldwide, approximately 15 million infants are born prematurely each year, with low- and middle-income countries bearing the brunt of this burden[1]. In India, preterm birth rates are among the highest globally, accounting for nearly 12% of all live births (Ministry of Health and Family Welfare, 2020)[2]. These premature deliveries are often associated with severe long-term consequences, including respiratory dysfunction, developmental delays, and neurological impairments, placing immense strain on families and healthcare systems[3]. Early identification of pregnancies at risk of preterm delivery is crucial for implementing timely interventions to improve neonatal outcomes. Among various predictive methods, cervical length measurement in the second trimester has emerged as a reliable and non-invasive tool. A cervical length of less than 25 mm, particularly in combination with a history of spontaneous preterm birth, is strongly associated with an increased risk of preterm delivery[4]. This association has been validated across diverse populations, including Indian women, where studies indicate that a short cervical length significantly correlates with adverse pregnancy outcomes[5]. Despite the robust evidence supporting cervical length measurement as a predictive tool, its routine implementation in clinical practice remains inconsistent. Factors such as limited access to healthcare, socio-economic disparities, and a lack of standardized protocols in resource-limited settings hinder its widespread adoption[6]. Additionally, maternal factors such as demographic characteristics, nutritional status, mechanical cervical conditions, and comorbidities further complicate the risk stratification process[7]. A history of spontaneous preterm birth remains one of the strongest independent predictors of recurrence, underscoring the need for targeted interventions in high-risk populations[8].

This study aims to assess the incidence of preterm births at our institution and identify major contributing factors, with a specific focus on the role of maternal characteristics and second-trimester cervical length. Furthermore, it seeks to evaluate the efficacy of cervical length measurements in predicting preterm deliveries, particularly in resource-limited settings. By addressing existing gaps in knowledge, this research aspires to provide insights for optimizing antenatal care protocols and reducing the burden of preterm birth in vulnerable populations.

MATERIAL AND METHODS

Ethical Statement

This study adhered to the ethical guidelines set by the Institutional Ethics Committee of NIMS University, Jaipur. Ethical approval was obtained before the study commenced. Written informed consent was collected from all participants after explaining the study objectives, procedures, and their right to withdraw at any stage. Participant confidentiality was strictly maintained, with no identifying information included in the analysis or reporting.

Study Population

The study was conducted at NIMS Medical College and Hospital, Jaipur, targeting pregnant women attending antenatal clinics. Participants were selected using purposive sampling, ensuring adherence to specific inclusion and exclusion criteria. Eligible participants included pregnant women aged 21 to 35 years with a confirmed singleton pregnancy. Gestational age was verified between 18 and 24 weeks using the last menstrual period and first-trimester ultrasound reports. Exclusion criteria encompassed women with a history of first-trimester bleeding, previous cesarean section or myomectomy, uterine malformations or fibroids, multiple gestations, or those unwilling to provide consent. A total of 94 participants meeting these criteria were enrolled. Comprehensive demographic and clinical data, including age, parity, and socioeconomic status, were recorded to facilitate further analysis.

Procedure

After recruitment, participants underwent a detailed clinical assessment, including a review of medical, obstetric, and gynecological histories. Gestational age confirmation utilized the last menstrual period and first-trimester ultrasound reports. Cervical length measurement was performed using transvaginal ultrasonography, a reliable and standardized method for evaluating cervical morphology during pregnancy. Participants were positioned comfortably in the lithotomic position, maintaining privacy throughout the procedure. A sterile, lubricated transvaginal ultrasound probe was gently introduced into the vaginal canal to visualize the cervical canal in the mid-sagittal plane. Care was taken to minimize pressure on the cervix to avoid artificial elongation. Measurements were taken from the internal os to the external os, with three measurements recorded for precision, and the shortest measurement used for analysis. Cervical lengths were categorized into three groups: ≤2.5 cm, 2.6–3.4 cm, and ≥3.5 cm.

Follow-Up and Outcome Assessment

Participants were closely monitored throughout their pregnancies until delivery. Key pregnancy outcomes were documented, including gestational age at delivery, mode of delivery (vaginal or cesarean), and neonatal outcomes. Outcomes were classified into vaginal delivery, preterm vaginal delivery, lower segment cesarean section (LSCS), and

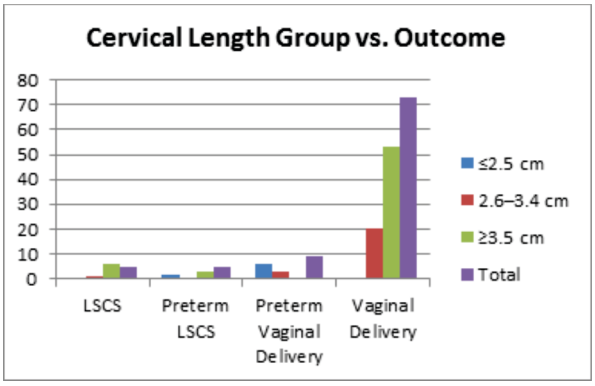
preterm LSCS. Data collected were analyzed statistically to evaluate the relationship between cervical length and pregnancy outcomes. A chi-square test was employed to determine the significance of this association, with a p-value of less than 0.05 considered statistically significant. Continuous variables, such as gestational age, were analyzed using appropriate statistical techniques. Participants requiring clinical interventions based on cervical length measurements or other findings were managed in accordance with established clinical guidelines, ensuring optimal care for both mother and fetus. Throughout the study, ethical principles, including confidentiality and participants' autonomy, were strictly upheld.

RESULT

This study explores the relationship between second-trimester transvaginal ultrasound measurements of cervical length and pregnancy outcomes, particularly the prediction of preterm birth. The analysis evaluates cervical length as a significant predictor for adverse pregnancy outcomes, using a sample size of 94 participants.

Table 1: Contingency Table (Cervical Length Group vs. Outcome)

Cervical Length Group	LSCS	Preterm LSCS	Preterm Vaginal Delivery	Vaginal Delivery	Total	p-value
≤2.5 cm	0	2	6	0	8	0.049
2.6–3.4 cm	1	0	3	20	24	
≥3.5 cm	6	3	0	53	62	
Total	5	5	9	73	94	

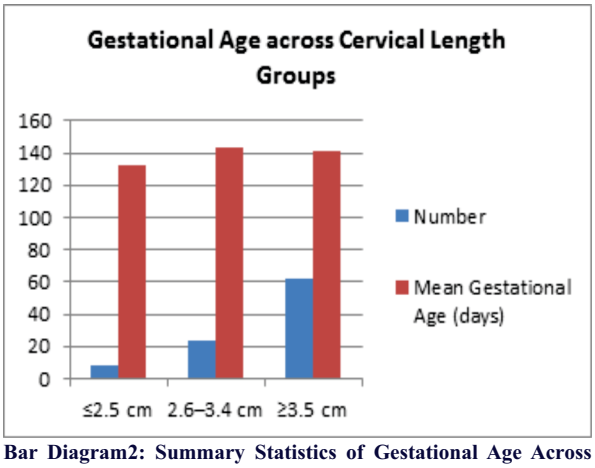


Bar Diagram1 : Showing Cervical Length in Association with

A chi-square test revealed a statistically significant association between cervical length groups (≤2.5 cm, 2.6–3.4 cm, and ≥3.5 cm) and pregnancy outcomes (LSCS, Preterm LSCS, Preterm Vaginal Delivery, and Vaginal Delivery), with a p-value of 0.049.

Table 2: Summary Statistics of Gestational Age Across Cervical Length Groups

Cervical Length Group	Number	Mean Gestational Age (days)	p-value
≤2.5 cm	8	132.25	0.715
2.6–3.4 cm	24	142.89	
≥3.5 cm	62	141.36	



Bar Diagram2: Summary Statistics of Gestational Age Across Cervical Length Groups

According to table 2 and Bar diagram 2 , Participants with cervical lengths ≤2.5 cm had the lowest mean gestational age (132.25 days), but the difference across groups was not statistically significant (p = 0.715).

DISCUSSION

Preterm birth remains a leading cause of neonatal morbidity and mortality worldwide, making its early prediction and prevention a priority in maternal-fetal medicine. This study aimed to explore the relationship between second-trimester transvaginal ultrasound measurements of cervical length and pregnancy outcomes, particularly preterm birth. A total of 94 participants were categorized into three cervical length groups (≤2.5 cm, 2.6–3.4 cm, and ≥3.5 cm). The study focused on key outcomes, including lower segment cesarean section (LSCS), preterm LSCS, preterm vaginal delivery, and full-term vaginal delivery. Statistical analyses revealed significant associations between cervical length and these outcomes, highlighting the importance of early identification of women at risk for preterm birth. The results indicated a statistically significant association between cervical length groups and pregnancy outcomes (p = 0.049) as shown in Table 1. Participants with cervical lengths ≤2.5 cm had the highest proportion of preterm vaginal deliveries (6 out of 8 cases) and no cases of full-term vaginal delivery. Conversely, participants with cervical lengths ≥3.5 cm predominantly experienced vaginal deliveries at term (53 out of 62 cases), with minimal preterm outcomes. Those in the intermediate group (2.6–3.4 cm) demonstrated a more varied distribution, with most outcomes leaning towards term vaginal delivery (20 out of 24 cases). However, the mean gestational age across cervical length groups (Table 2) did not show statistically significant differences (p = 0.715), potentially due to sample size limitations or other confounding factors. These findings suggest that cervical length remains a robust indicator of preterm birth risk but may have limited predictive power for gestational age when considered alone.

Comparing this study with existing literature reveals both similarities and unique findings. A systematic review by Romero et al. (2016)[9] emphasized that cervical lengths ≤2.5 cm significantly increased the risk of preterm birth, supporting the findings of this study. Similarly, a meta-analysis by Conde-Agudelo et al. (2018)[10] demonstrated that cervical length screening is a critical tool for identifying high-risk pregnancies, particularly when combined with interventions such as vaginal progesterone. Our study's findings align with these observations, particularly in the predictive value of shorter cervical lengths for preterm vaginal deliveries. However, discrepancies, such as the lower predictive value for preterm LSCS in our study, may stem from variations in clinical practices, patient demographics, or the relatively smaller sample size in our analysis. The potential mechanisms underlying the relationship between cervical length and preterm birth are multifaceted. Short cervical lengths may result from structural weakness or premature remodeling of the cervix, influenced by mechanical stress from fetal growth and uterine pressure (Iams et al., 2016)[11]. Hormonal factors, particularly the role of progesterone, also play a crucial role. Progesterone maintains cervical integrity by inhibiting inflammatory processes and collagen breakdown (Romero et al., 2016)[8]. The administration of vaginal progesterone has been shown to reduce preterm birth rates in women with short cervical lengths, as evidenced in randomized controlled trials (Fonseca et al., 2007; Hassan et al., 2011)[12,13]. These findings highlight the importance of addressing both biomechanical and biochemical pathways in managing preterm birth risk. Hence I can be said that, this study reinforces the clinical significance of second-trimester cervical length measurement as a predictor of preterm birth and adverse pregnancy outcomes. The findings are consistent with prior research but also underscore the need for larger studies to further elucidate these associations and optimize risk stratification. Integrating cervical length screening with evidence-based interventions, such as progesterone supplementation, could improve maternal and neonatal outcomes.

CONCLUSION

Second-trimester cervical length measurement is a reliable predictor of preterm birth and adverse pregnancy outcomes. Shorter cervical lengths significantly increase preterm delivery risk, underscoring the importance of early screening and risk stratification. These findings highlight the potential for integrating cervical length assessment into routine prenatal care to enhance maternal and neonatal outcomes.

Authors' Contributions

All authors contributed significantly to the study's conception, design, and execution. Dr. Saba Fazli and Dr. Yasmin Syed contributed to the study design and data collection also supervised the research and provided critical insights into the methodology and analysis. Dr Roopali Nath Mathur contributed to statistical analysis and data interpretation. All authors reviewed the manuscript and contributed to the discussion and conclusions. All authors reviewed and approved the final version of the manuscript for publication.

Conflict Of Interest

The authors declare no conflicts of interest concerning this study.

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REFERENCES

1. Blencowe, H., Cousens, S., Oestergaard, M. Z., Chou, D., Moller, A. B., Narwal, R., ... & Lawn, J. E. (2013). National, regional, and worldwide estimates of preterm birth rates in the year 2010 with time trends since 1990 for selected countries: a systematic analysis and implications. The Lancet, 379(9832), 2162-2172.
2. Ministry of Health and Family Welfare. (2020). National Health Profile 2020. Government of India.
3. Goldenberg, R. L., & Culhane, J. F. (2010). Preterm birth: Incidence, causes, and consequences. American Journal of Obstetrics and Gynecology, 188(5), S4-S8.
4. Conde-Agudelo, A., Romero, R., & Hassan, S. S. (2018). Transvaginal ultrasound measurement of the cervical length for the prediction of spontaneous preterm birth: a systematic review and meta-analysis. American Journal of Obstetrics & Gynecology, 216(2), 131-147.
5. Kaimal, A. J., Wright, J. D., & Hyer, M. (2017). Cervical length screening and prevention of preterm birth: A contemporary review. American Journal of Perinatology, 34(6), 602-612.
6. Ministry of Health and Family Welfare. (2020). National Health Profile 2020. Government of India
7. Goyeneche, L. A., Serna, A., & Sosa, C. (2018). Risk factors and predictors of spontaneous preterm birth: A review of recent evidence. Journal of Perinatology, 38(1), 3-10.
8. Romero, R., Dey, S. K., & Fisher, S. J. (2016). Preterm labor: One syndrome, many causes. Science, 345(6198), 760-765
9. Romero, R., Dey, S. K., & Fisher, S. J. (2016). Preterm labor: One syndrome, many causes. Science, 345(6198), 760-765.
10. Conde-Agudelo, A., Romero, R., Hassan, S. S., & Yeo, L. (2018). Transvaginal ultrasound for the prediction of preterm birth in twin pregnancies: A systematic review and meta-analysis. American Journal of Obstetrics and Gynecology, 219(4), 356.e1-356.e18.
11. Iams, J. D., Romero, R., & Culhane, J. F. (2016). Preterm birth: A global challenge. The Lancet, 388(10063), 22-30.
12. Fonseca, E. B., Celik, E. G., Parra, M., Singh, M., & Nicolaides, K. H. (2007). Progesterone and the risk of preterm birth among women with a short cervix. New England Journal of Medicine, 357(5), 462-469.
13. Hassan, S. S., Romero, R., Vidyadhari, D., et al. (2011). Vaginal progesterone reduces the rate of preterm birth in women with a sonographic short cervix: A multicenter, randomized, double-blind, placebo-controlled trial. Ultrasound in Obstetrics & Gynecology, 38(1), 18-31.