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Assessment of Uterocervical Angle as a predictor of spontaneous preterm birth

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ABSTRACT

Introduction

The changes in the "uterocervical angle (UCA)" have been reported to play a crucial role in "spontaneous preterm birth (sPTB)".

Purpose

The study aimed "to determine whether the UCA correlates with the risk of early 28-34 weeks and late 34-37 weeks preterm birth and assess the interobserver reproducibility of this measurement and evaluate its sensitivity as a predictor of sPTB".

Methods

The prospective observational study was conducted on n=50 women with singleton pregnancies of gestational age 16 to 24 weeks. In all the patients, transvaginal sonography (TVS) was performed, and UCA was noted. The ultrasound machine software was utilized for sample size determination, with a set power of 90% and α-error at 0.05 and considering findings from prior studies. To discern the variation in predictive efficacy between these two measures, a minimum sample size of 75 patients was required.

Results

The mean age of study subjects was 28.16±2.90 years, ranging from 23 to 34 years. Obtuse UCA >95° was seen in 47 cases, out of which 46 had PTBs. A significant difference was found between UCA when compared between the preterm and term group (102.40±4.36 vs 97.67±4.87, $P<0.001$). When UCA was reached within the preterm group, it found that UCA was higher in < 34-week group patients (106.25±4.13) compared to 34-37-week group patients (101.33±4.36); however, the difference was statistically insignificant ($P>0.05$). A significant association was found between UCA >95° and the sPTB ($P<0.001$). The sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of UCA >95° in women who delivered at <37 weeks was found to be better than other cutoffs such as UCA 95° -105° at 34-37 weeks, and ≥105° at <34 weeks.

Conclusion

UCA was found to be a novel ultrasound parameter that can effectively predict sPTB.

INTRODUCTION

Preterm birth (PTB) is the term used to describe childbirth that occurs before 37 complete weeks or 259 days of gestation, and it is one of the main factors affecting the mortality and morbidity of newborns (Liu et al., 2015). Preterm birth rates are estimated to range from 5% in developed nations to 25% in underdeveloped nations, although there are no recent reliable data on a global scale. For many years, the preterm birth rate in affluent countries has been relatively steady at 5-10% (Steer 2005). Pregnant women who are at risk for spontaneous PTB (sPTB) must be identified as soon as possible. Numerous unidentified processes can cause labour to begin in the case of 3-5 PTB, which has a wide range of etiologies. Therefore, it is challenging to develop straightforward diagnostic, therapeutic, or preventative methods for the entire population (Farras Llobet et al., 2020).

“Maternal history, obstetric ultrasound abnormalities, such as the short cervix, vaginal microbiome, and genetics” are only a few of the variables that contribute to a pregnant woman's chance of developing sPTB (Phillips et al., 2017). Given PTB's significant and widespread effects, it's crucial to identify more vulnerable people. Based on the idea that the cervix serves as an anatomical marker of the underlying pathogenic process leading to sPTB, evaluation of the cervix has been utilized as a method to predict preterm labour (Singh et al., 2022). The surrounding pelvic organs and the expanding uterus during pregnancy exert some pressure on the uterine cervix. As a result, the internal ostium and cervical function are altered because of the interaction between these physiological stresses and individual anatomy (House et al., 2013). Cervical length (CL) and uterocervical angle (UCA) are two examples of ultrasonographic metrics that have been created to evaluate cervical anatomy (Myers et al., 2015).

Recently, it has been proposed that the anterior UCA, or the angle created between the anterior uterine wall and the endocervical canal, is a predictor of sPTB. The hypothesis underlying pathophysiology theory is entirely physical. Depending on the anterior UCA, the force that a gravid uterus delivers to the cervix varies. The cervical canal is either "pressed shut" in cases of an acute angle or "pressed open" in cases of an obtuse angle as pregnancy progresses due to the shifting of the pregnant uterus' force towards the cervix (Spong, 2007). According to certain studies, the UCA rather than cervical length (CL) may predict sPTB more accurately. Therefore, the present study was undertaken “to determine whether the UCA correlates with the risk of early 28-34 weeks and late 34-37 weeks preterm birth and assess the interobserver reproducibility of this measurement and evaluate its sensitivity as a predictor of sPTB.

METHODS

“The present prospective observational study was conducted at the Department of Obstetrics and Gynecology in collaboration with the Department of Radiology, Banaras Hindu University, Varanasi, Uttar Pradesh” from June 2017 to July 2019 after institutional ethical committee approval. A total of 50 pregnant ladies with singleton pregnancies of gestational age 16 to 24 weeks and patients of age group 19 to 34 years were included in the study. Whereas patients of age group <19 years and >34 years, multiple dilatation and curettage, patients with multiple pregnancies, polyhydramnios, history of cervical excision treatment, systemic illnesses such as “diabetes, thyroid disorders, hypertension, chronic renal disease, previous history of pre-term births uterine anomalies, tuberculosis and patients who were smoking and illicit drug abuse” were excluded from the study. Written informed consent was obtained before the initiation of the study. Transvaginal sonography (TVS) screening for uterocervical angle was reported performed in all women between 16 and 24 weeks. TVS was done on PHILIPSIU22.

Sample size

The ultrasound machine software was utilized for sample size determination, with a set power of 90% and α-error at 0.05 and considering findings from prior studies. To discern the variation in predictive efficacy between these two measures, a minimum sample size of 75 patients was required.

Assessment of UCV

“The anterior uterine wall was imaged. External and internal ostium were identified. The first line was drawn between the internal and external ostium. The second line was drawn parallel to the lower aspect of the anterior uterine wall. The angle created by the intersection of these two lines was measured at the internal ostium as the uterocervical angle and recorded”.

Figure 1A:
Transvaginal sonographic image of the UCA measurement technique

Figure 1B:
Transvaginal sonographic image of the UCA measurement technique

Figure 1 "UCA. Transvaginal sonographic images show the UCA measurement technique. UCA was calculated as the angle between two lines. The first line was drawn between the internal and external ostium (os). The second line was drawn 3 cm parallel to the lower aspect of the anterior inner uterine wall, passing through the end of the first line at the internal os. **Figure 1A**: Obtuse UCA <95° in a pregnant woman (gestational age 19 weeks) who delivered at term ≥34 weeks. **Figure 1B**: Another pregnant woman with an obtuse angle of 120.7° was delivered at preterm <34 weeks".

Statistical analysis

The data was analysed using SPSS software (Version 22.0. IBM Corp. Armonk, New York, United States). The Pearson test was used to find the association between variables, and regression analysis was performed. $P<0.05$ was considered statistically significant.

RESULTS

The mean age of study subjects was 28.16±2.90 years, ranging from 23 to 34 years. Among the study subjects, 46 women had sPTBs; out of these patients, 15 had cesarean section after initial labour, and 31 had a normal delivery, whereas four women delivered at term by cesarean section. Patients in the preterm group were further categorized into two groups based on gestational age, such as <34 weeks (n=8) and 34 to 37 weeks (n=39).

Obtuse UCA >95° was seen in 47 cases, out of which 46 had PTBs (table 1). A significant difference was found between UCA when compared between the preterm and term group (102.40±4.36 vs 97.67±4.87, $P<0.001$). When UCA was reached within the preterm group, it found that UCA was higher in < 34-week group patients (106.25±4.13) compared to 34-37-week group patients (101.33±4.36); however, the difference was statistically insignificant ($P>0.05$).

Table 1:
Demographic Characteristics of Study Subjects

Characteristic	Mean ± SD (Range)	Total Subjects (n)	Preterm Births (n)	Caesarean Section (n)	Gestational Age (n)
Age (years)	28.16 ± 2.90 (23 to 34)				
Gender			Women: 46		
Preterm Births			Total: 46	Initial Labor: 15 Normal Delivery: 31	<34 weeks: 8, 34-37 weeks: 39
Caesarean Section				Caesarean Section: 4	
Uterine Arteries (UCA) Angle	102.40 ± 4.36	47	46		
UCA Comparison (Preterm vs Term)			P<0.001		
UCA Comparison (Within Preterm)					<34 weeks vs 34-37 weeks: P>0.05

Note: SD is the standard deviation, and n is the number of subjects. The data is presented as mean ± SD for continuous variables and counts for categorical variables.

Table 1 Demographic Results:

The demographic characteristics provide an overview of the study subjects, including their age, gender distribution, prevalence of preterm births, and details related to gestational age and delivery methods. The mean age of the subjects was 28.16 ± 2.90 years, with a range of 23 to 34 years. Out of 46 women, 46 experienced preterm births, with 15 undergoing initial labour and 31 having normal deliveries. Additionally, four women delivered via cesarean section. The Uterine Arteries (UCA) Angle was measured at 102.40 ± 4.36, and a significant difference was observed in UCA when comparing preterm and term births (P<0.001). However, within the preterm group, the difference in UCA between <34 weeks and 34-37 weeks was statistically insignificant (P>0.05). Further analysis of these data points will provide insights into the relationship between UCA and gestational outcomes.

Table 2:
Distribution of subjects according to preterm and term births and UCA

UCA	Spontaneous preterm birth (<37 weeks)		Delivery at ≥37 weeks
	At <34 weeks	At 34-37 weeks	
<95º	0	1	2
95º -105º	1	25	0
≥105º	7	13	1
Total	8	39	3

The interpretation of the results from **Table 2** involves analyzing the distribution of subjects based on Uterocervical Angle (UCA) measurements and their association with the timing of births, distinguishing between preterm and term deliveries.

1. UCA <95º: There were no spontaneous preterm births at less than 34 weeks in this category. One spontaneous preterm birth occurred at 34-37 weeks. Two deliveries occurred at or after 37 weeks.
2. UCA 95º - 105º: One spontaneous preterm birth at less than 34 weeks. A substantial number (25) of spontaneous preterm births at 34-37 weeks. No deliveries occurred at or after 37 weeks.
3. UCA ≥105º: Seven spontaneous preterm births at less than 34 weeks. Thirteen spontaneous preterm births at 34-37 weeks. One delivery occurred at or after 37 weeks.

Total: Eight spontaneous preterm births at less than 37 weeks. Thirty-nine spontaneous preterm births at 34-37 weeks. Three deliveries occurred at or after 37 weeks.

Interpretation:

UCA measurements in the range of 95º - 105º appear to be associated with a higher incidence of spontaneous preterm births at 34-37 weeks. UCA measurements below 95º and above 105º may have different associations with the timing of childbirth, but further statistical analysis is needed to confirm these observations and assess the significance of these associations. The total numbers in each category provide an overview of the distribution of preterm and term births based on UCA measurements.

Table 3:
Diagnostic indices of UCA (Ultrasound software analysis)

UCA	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
>95º	76.92	89.4	80	87.5
95º -105º	68.4	90.7	72	89
≥105º	71.4	94.1	71.4	96.9

Interpretation (Table 3):

UCA >95º:

- *Sensitivity*: 76.92% - The ability of UCA >95º to correctly identify those with spontaneous preterm births.
- *Specificity*: 89.4% - The ability of UCA >95º to correctly identify those without spontaneous preterm births.
- *PPV* (Positive Predictive Value): 80% - The probability of having spontaneous preterm births when UCA >95º is positive.
- *NPV* (Negative Predictive Value): 87.5% - The probability of not having unplanned preterm births when UCA >95º is negative.

UCA 95º -105º:

- *Sensitivity*: 68.4% - The ability of UCA 95º -105º to correctly identify those with spontaneous preterm births.

- *Specificity*: 90.7% - The ability of UCA 95º -105º to correctly identify those without spontaneous preterm births.
- *PPV*: 72% - The probability of having spontaneous preterm births when UCA 95º -105º is positive.
- *NPV*: 89% - The probability of not having spontaneous preterm births when UCA 95º -105º is negative.

UCA ≥105º:

- *Sensitivity:* 71.4% - The ability of UCA ≥105º to correctly identify those with spontaneous preterm births.
- *Specificity:* 94.1% - The ability of UCA ≥105º to correctly identify those without spontaneous preterm births.
- *PPV:* 71.4% - The probability of having spontaneous preterm births when UCA ≥105º is positive.
- *NPV:* 96.9% - The probability of not having spontaneous preterm births when UCA ≥105º is negative.

These diagnostic indices provide insights into the performance of Uterocervical Angle measurements in predicting spontaneous preterm births at different cut-off values. The balance between sensitivity and specificity, along with predictive values, aids in understanding the clinical utility of UCA as a predictive measure for preterm births.

Table 4:
Pearson correlation coefficient results for the spontaneous preterm births at <34 weeks and between 34-37 weeks

Parameter	Value
Pearson correlation coefficient (r)	**0.5818**
r^2	0.3385
P-value	0.4182
Covariance	38.6667
Sample size (n)	4
Statistic	1.0117

Analysis of Table 4 indicates the Pearson correlation results, which revealed a non-significant, considerable positive association between spontaneous preterm births at <34 weeks and spontaneous preterm births at 34-37 weeks (r^2) = .582, p = .418).

Table 5:
Pearson correlation coefficient results for the spontaneous preterm births at <34 weeks and delivery at ≥37 weeks

Parameter	Value
Pearson correlation coefficient (r)	**0.4427**
r^2	0.196
P-value	0.5573
Covariance	2.3333
Sample size (n)	4
Statistic	0.6983

Table 5 Results:

The Pearson correlation findings suggest a non-significant, moderate positive correlation between spontaneous preterm births at <34 weeks and deliveries at ≥37 weeks (r^2 = .443, p = .557).

Table 6:
The occurrence of spontaneous preterm births (<37 weeks) and term births in women are distributed based on cervical length

Cervical length (cm)	Spontaneous preterm births (<37wks)	Term delivery (37wks)
n (%)	n (%)	
<2.5	12 (26.08%)	3 (9.67%)
2.5	28 (60.86%)	22 (70.96%)

Table 6 presents the distribution of cervical length (in centimetres) and the corresponding percentages of spontaneous preterm births (before 37 weeks) and term deliveries (at 37 weeks).

Scenario 1

1. Cervical Length < 2.5 cm:
2. Spontaneous preterm births: 12 cases, accounting for 26.08%.
3. Term deliveries: 3 instances, constituting 9.67%.

Scenario 2

1. Cervical Length 2.5 cm:
2. Spontaneous preterm births: 28 cases, making up 60.86%.
3. Term deliveries: 22 cases, representing 70.96%.

This data suggests an association between cervical length and the likelihood of spontaneous preterm births versus term deliveries. Specifically, shorter cervical lengths appear to be correlated with a higher incidence of spontaneous preterm births

Figure 2:
The regression analysis between the time of delivery in weeks and cervical length (cms) in the females

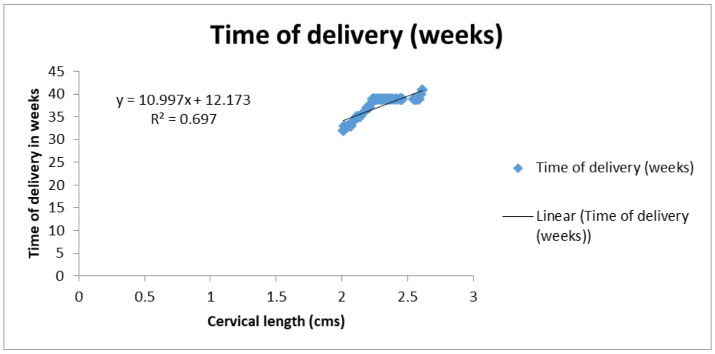

Figure 2 shows the regression analysis between the time of delivery in weeks and cervical length (cms) in the females.

Figure 3:
The regression analysis between the time of delivery in weeks and the cervical angle in the pregnant females

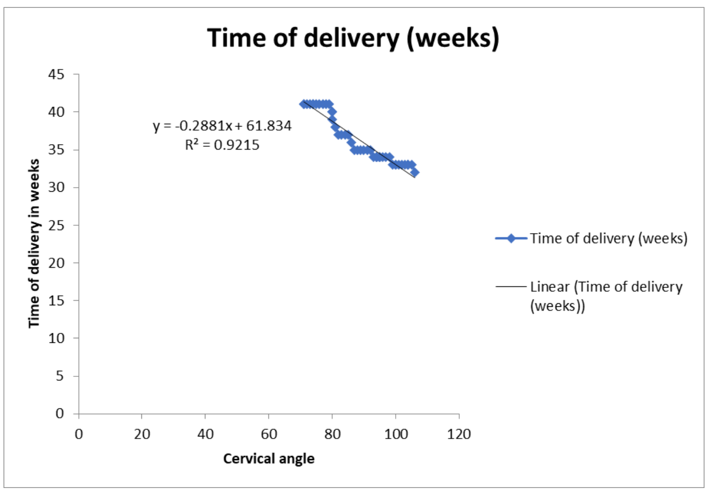

Figure 3 shows the regression analysis between the time of delivery in weeks and the cervical angle in the pregnant females.

Table 7:
Regression ANOVA: Time of delivery vs. cervical length

Source	DF	Sum of Square	Mean Square	F Statistic (df_1,df_2)	P-value
Regression (between $\hat{y}_i$ and $\bar{y}$)	1	188.4858	188.4858	108.1369 (1,47)	8.926e-14
Residual (between y_i and $\hat{y}_i$)	47	81.9224	1.743		
Total (between y_i and $\bar{y}$)	48	270.4082	5.6335		

Table 7 shows the regression analysis table between the time of delivery in weeks and cervical length (cms) in the females.

Table 7 Results:

The cervical length in centimetres (cms) emerged as a noteworthy predictor of the time of delivery in weeks, as elucidated by the outcomes of the regression analysis. The coefficient of determination (R^2), standing at 0.697, underscores a robust relationship between cervical length and the predicted time of delivery. Further reinforcing the overall significance of the model, the F-statistic ($F(1,47)$) yielded a value of 108.14, accompanied by a p-value below 0.001. The regression coefficient (β) assigned to cervical length was determined to be 11, with a p-value less than 0.001. This implies that an increase in cervical length is concomitant with a significant upswing in the predicted time of delivery.

Additionally, the intercept (α) registered at 12.17 with a p-value less than 0.001, indicating that even when the cervical length is zero, a baseline predicted time of delivery persists. Delving into the specifics, the coefficient of determination, R-squared (R^2), at 0.697 signifies that an appreciable 69.7% of the variability in the Time of delivery (weeks) can be attributed to the Cervical length (cms). This highlights the substantial explanatory power of variations in cervical length on the observed variability in the predicted time of delivery. The correlation coefficient, R, reaching 0.8349, elucidates a highly robust and direct relationship between Cervical length (cms) and Time of delivery (weeks). This strong correlation indicates a consistent impact on the predicted time of delivery corresponding to increases or decreases in cervical length. Examining the Standard deviation of the residuals (Sres) at 1.3202 reveals the typical amount of variability in the Time of delivery (weeks) that remains unexplained by the Cervical length (cms) predictor. Moving to the slope (b_1), recorded as 10.9974 with a confidence interval [8.8698, 13.1249], it implies that for every one-unit increase in Cervical length (cms), the predicted Time of delivery (weeks) is anticipated to increase by 10.9974, a conclusion within the provided confidence interval. Considering the y-intercept (b_0) at 12.1733 with a confidence interval [7.2216, 17.125], it signifies that when Cervical length (cms) is zero, the predicted value for Time of delivery (weeks) is 12.1733, as indicated by the specified confidence interval. The x-intercept at -1.1069 suggests that when the expected Time of delivery (weeks) is zero, the associated Cervical length (cms) value is estimated to be -1.1069.

Figure 4:
The regression ANOVA analysis table between the time of delivery in weeks and cervical length (cms) in the females

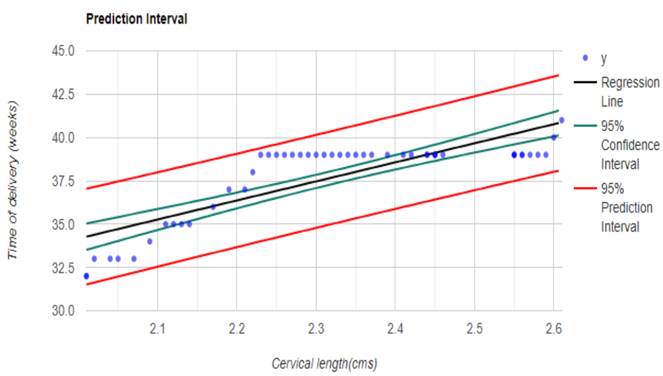

Figure 4 shows the regression ANOVA analysis table between the time of delivery in weeks and cervical length (cms) in the females.

Table 8:
Regression ANOVA: Time of delivery vs. cervical angle

Source	DF	Sum of Square	Mean Square	F Statistic (df_1,df_2)	P-value
Regression (between $\hat{y}_i$ and $\bar{y}$)	1	444.7837	444.7837	551.4305 (1,47)	0
Residual (between y_i and $\hat{y}_i$)	47	37.9102	0.8066		
Total (between y_i and $\bar{y}$)	48	482.6939	10.0561		

Table 8 shows the regression analysis table between the time of delivery in weeks and the cervical angle in pregnant females.

Table 8 results:

The coefficient of determination (R-squared or R^2) stands at 0.9215, signifying that a substantial 92.1% of the variability in the Time of delivery in weeks is effectively explained by the cervical angle. The correlation coefficient (R) of -0.9599 indicates an exceedingly strong inverse relationship between the Cervical angle and the Time of delivery in weeks. Examining the Standard deviation of the residuals (Sres), which is 0.8981, provides insight into the typical amount of unexplained variability present in the Time of delivery in weeks. Analyzing the slope (b_1), which is -0.2881 with a confidence interval of [-0.3128, -0.2634], reveals that a one-unit increase in the Cervical angle corresponds to a predicted decrease of 0.2881 in the Time of delivery in weeks, as per the specified confidence interval. The y-intercept (b_0), standing at 61.8342 with a confidence interval of [59.6198, 64.0485], implies that in the scenario where the Cervical angle is zero, the predicted value for the Time of delivery in weeks is estimated to be 61.8342, a conclusion drawn within the provided confidence interval. Additionally, the x-intercept, denoted as 214.6225, indicates that when the predicted Time of delivery in weeks reaches zero, the associated cervical angle value is projected to be 214.6225.

Figure 5:
The prediction interval graph line for time of delivery in weeks and cervical angle in pregnant females

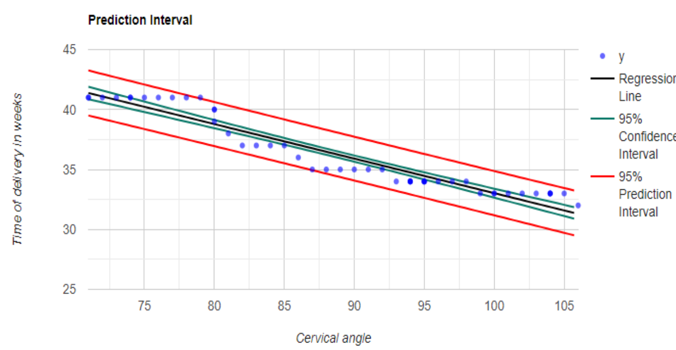

Figure 5 shows the prediction interval graph line for time of delivery in weeks and cervical angle in pregnant females.

Table 9:
ANOVA regression between cervical angle and cervical length

Source	DF	Sum of Square	Mean Square	F Statistic (df_1,df_2)	P-value
Regression (between $\hat{y}_i$ and $\bar{y}$)	1	5264.9263	5264.9263	2644.7453 (1,47)	0
Residual (between y_i and $\hat{y}_i$)	47	93.5635	1.9907		
Total (between y_i and $\bar{y}$)	48	5358.4898	111.6352		

Table 9 Results:

Examining the relationship between Cervical Angle and Cervical length reveals compelling insights. The coefficient of determination, R-Squared (R^2), stands impressively at 0.9825, underscoring that an overwhelming 98.3% of the variability in Cervical Angle is explicable by variations in Cervical length. This emphasizes the substantial impact Cervical length has on the observed variability in Cervical Angle.

Delving further, the correlation coefficient (R) is calculated at -0.9912, indicating an exceedingly robust and inverse relationship between Cervical length and Cervical Angle. This underscores the consistent impact that changes in Cervical length have on the predictable variations in Cervical Angle. Turning our attention to the Standard deviation of the residuals (Sres), standing at 1.4109, we discern the typical amount of unexplained variability in Cervical Angle that persists even after considering Cervical length. This further emphasizes the nuances and intricacies in the relationship between the two variables. Unpacking the slope (b_1) of -58.1226 with a confidence interval of [-60.3963, -55.849], we infer that a one-unit increase in Cervical length is associated with a substantial decrease of 58.1226 in the predicted value of Cervical Angle. This conclusion is well-supported within the provided confidence interval. Examining the y-intercept (b_0) at 223.9821 with a confidence interval of [218.6903, 229.274], we understand that when Cervical length is zero, the predicted value for Cervical Angle is 223.9821, as indicated by the specified confidence interval. This provides valuable context to the baseline prediction in the absence of Cervical length. The x-intercept, denoted as 3.8536, represents the point where the Cervical Angle is predicted to be zero, emphasizing a nuanced aspect of the relationship.

DISCUSSION

The occurrence of PTB is linked to a higher likelihood of neonatal mortality and morbidity (Yoshida et al., 2014). It is believed that sPTB stems from a combination of factors, including the vulnerability of cervical tissue, which usually serves as a protective barrier between the uterus and the vagina.

The integrity of the cervical structure is contingent upon the robustness of its collagen network (Myers et al., 2009). Cervical insufficiency arises from the premature softening of the cervix, a phenomenon that diminishes its ability to flex and resist deformation, brought about by the disruption of collagen fibrils and a 5% rise in tissue hydration (Dagdeviren et al., 2018).

Cervical evaluation has been conducted through a range of methodologies, including “digital cervical examination”, TVS, “cervical elastography”, and “measurement of cervical apparent diffusion coefficient (ADC)”. Recently, UCA has been recognized as a potential ultrasound indicator for predicting sPTB (Daskalakis, 2018). The identification of wide UCA during the 2nd trimester is linked to an increased risk of sPTB. The reason for this relationship is based on the mechanical attributes of the UCA. An acute UCA facilitates a protective mechanical obstruction against the occurrence of sPTB (Daskalakis, 2018).

In the context of this research, during the 2nd trimester, UCA was significantly broader in the preterm birth group when compared to the term birth group. Furthermore, a significant correlation was observed between an enlarged UCA and the risk of sPTB. Women delivered at <34 weeks had wider UCA than women delivered at 34-37 weeks. In our study, UCA ≥105° is associated with sPTBs at <34 weeks. Whereas UCA 95° to 105° was associated with sPTBs at 34 to 37 weeks with a sensitivity of 71.4%, specificity of 94.1%, and p-value < 0.001 **(table 2)**. These findings follow previous studies conducted by Singh et al. (2022), Dziadosz et al. (2016), Niyomyam et al. (2022), Hessami et al. (2021), and Makled (2021).

Moreover, previous studies suggested that UCA is more sensitive in the determination of sPTBs than CL. In the survey conducted by Lynch et al., a comparison of performance metrics between UCA and CL revealed notable differences. UCA exhibited substantial sensitivity, surpassing 80%, but displayed relatively low specificity, falling below 35%. On the other hand, CL demonstrated higher specificity at 98.5%, yet its sensitivity was relatively lower, measured at 12.5% (Knight et al., 2018). Knight et al. assessed second-trimester UCA and noted that employing optimal cutoff values led to an improved predictive accuracy when compared to CL measurements for predicting preterm birth (PTB) before 34 weeks of gestation (Buck et al., 2017). A notable inverse correlation was found between UCA and gestational age at delivery, implying that as the UCA angle becomes more obtuse (exceeding 95 degrees), there is an associated rise in the occurrence of PCBs (Spong, 2007).

Various factors, such as ethnicity, race, and the socio-demographic background of patients, have the potential to influence cervical properties, including CL and UCA. Research has indicated that there exist disparities in second-trimester CL among different racial groups, particularly between black women and their white, Asian, and Hispanic counterparts. To the best of our knowledge, a previous study has yet to be conducted to examine the correlation between ethnicity and UCA. The strength of this study was its prospective nature. The study suggested that UCA is a novel ultrasound parameter that can serve as a better predictor of sPTB.

A significant association was seen between obtuse UCA and the risk of spontaneous preterm birth. We acknowledge certain limitations, including the sample size being relatively small; generalization could be better if a large sample size were included. The study was single-centered, and the investigator was not blind, which could have led to some bias. Moreover, we did not compare the role of CL with UCA. Advanced imaging techniques such as cervical elastography and measurement of sub-glandular ADC on magnetic resonance imaging may be used in the future to predict sPTB.

CONCLUSION

In the 2nd trimester, wider UCA is associated with sPTB. Thus, the UCA is a potential novel screening modality for the determination of sPTB. We recommend that the use of UCA in daily practice as a determinant factor can be beneficial for "decision-making". Further studies are warranted to confirm the present study's findings.

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Conflicts of Interest: None declared.

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