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Transvaginal Ultrasound Measurement of Cervical Length during Second Trimester of Pregnancy to Predict Pre Term Birth in Asymptomatic Women

Maira Mushtaq[1], Alia Bano[1], Samina Saleem[1], Kaneez Fatima[1], Ayesha Hussain[1], Bushra[2]

[1]Department of Obstetrics and Gynaecology, Patel Hospital, Karachi, Pakistan
[2]Research Department, Patel Hospital, Karachi, Pakistan

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Correspondence to: Maira Mushtaq, Department of Obstetrics and Gynaecology, Patel Hospital, Karachi, Pakistan.
Email: mairamushtaq5@gmail.com

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ABSTRACT

Objective: To determine association of ultrasound measurement of cervical length during second trimester (20-24 weeks) for prediction of preterm birth in asymptomatic women. **Design and Setting:** Prospective cohort study was conducted at Gynaecology and Radiology department of Patel Hospital, Karachi, from April 2023 to March 2024. **Methodology:** 51 women with low risk single alive pregnancy between 20-24 weeks were included in this study. Written informed consent was obtained from all participants. Exclusion criteria were: History of preterm birth, Women with medical disorders, Bleeding or other signs of miscarriage and previous history of cervical surgery Transvaginal ultrasound for the measurement of cervical length performed along with the anomaly scan by our senior radiologists. **Results**: 51 women underwent transvaginal ultrasound for the measurement of cervical length at the time of anomaly scan, none of them had short cervix. Preterm birth was found in 3.9% (2/51) of pregnant women but both of them had cervical length >2.5cm. There is weak co relation between cervical length and gestational age at delivery.

INTRODUCTION

Delivery before 37 completed weeks of pregnancy is called preterm delivery [1]. The incidence is approximately 7 to 10% of deliveries in the England and Wales in 2012 and remain so till now. It results in high neonatal, infant mortality and morbidity rates. [2] 15 million newborns or around 11% of all births are born prematurely around the world each year.

Multiple newborn problems, long-term morbidity, and mortality are all linked to prematurity. [3] Neonatal mortality is influenced by gestational age at delivery, falling from less than 44.2% for those born at 23 weeks to 0% by 34 weeks. [4]

A history of previous spontaneous preterm births is the main risk factor for preterm delivery, however it accounts only 10-15% cases of total preterm births [5] , that is why screening of asymptomatic women is most important to reduce overall frequencies of preterm deliveries.

Previous researches have reported that a woman's obstetric history, past cervical excision, weight, and height are also significant risk factors for preterm birth. [6]

For prediction of preterm labor different techniques have been developed with low sensitivity and poor predictive value [7]. Recently, numerous researches have been done around the globe to determine the characteristics that are predictive of preterm birth, such as cervical length, foetal fibronectin, cortisol level, and placental hormone level. [8]

Measurement of cervical length is a reliable method for prediction of preterm delivery and a short cervix in the second trimester increases the risk of spontaneous preterm birth [9]. Average cervical length in non-pregnant female is 40-50mm. Transvaginal ultrasound measurement of the cervical length indicate a short cervix if it is less than 25mm.

Approximately 0.5% to 3% of asymptomatic singleton pregnant women have short cervical length. It is a recognized risk factor for preterm birth in the general obstetric population as well as in women who have a history of preterm birth [10].

The British Journal of Obstetrics and Gynecology recently published a study on the association between cervical length and preterm delivery in the year 2020, which

showed prevalence of 4.4% for short cervical length and predicting preterm birth in asymptomatic women with a sensitivity of 38.5% and specificity of 95.8% [11]. Another study by Almeida et al. in 2021, with prevalence rate of 4%, sensitivity rates of 37%, and specificity rates of 92% [12]. With a sensitivity of 80% and specificity of 94.73%, a similar study was also conducted in India, in the year 2020, and it came out to the conclusion that short cervical length increases the risk of preterm birth in asymptomatic women. [13]

It was suggested in 1990 to utilize transvaginal ultrasound to determine the cervical length as a predictor of preterm birth. Since then, the method has undergone thorough standardization. The sensitivity and specificity of transvaginal cervical length measurement are 28.57% and 94.94%, respectively [14].

Vaginal progesterone or cervical cerclage may be used to treat women with singleton pregnancies and short cervix in the second trimester, which may lead to a 30% decrease in the number of spontaneous preterm births and perinatal morbidity and mortality if it occurs before 33 weeks of gestation [15].

Based on recent literature, no such study has been published till date in Pakistan so the main aim of my study is to determine the frequency of preterm in our population based on transvaginal ultrasound measurement of cervical length during second trimester of pregnancy to predict pre term birth in asymptomatic women.

Objective

To determine association of ultrasound measurement of cervical length during second trimester (20-24 weeks) for prediction of preterm birth in asymptomatic women.

Rational of the Study: The aim of my study is to identify frequency of pre term labor in low risk asymptomatic women with the help of transvaginal ultrasound measurement of cervical length, so that we can apply this method in low risk antenatal population to predict and prevent this serious obstetrical issue.

Primary Outcome: Frequency of preterm birth in cases of short cervix

Secondary Outcome: Fetal weight, NICU admission

MATERIAL AND METHODS

It is a prospective cohort study, carried out at Gynae and Radiological Department of Patel Hospital for the duration from April 2023 to March 2024. 51 women with low risk single alive pregnancy between 20-24 weeks were included in this study. Written informed consent was obtained from all participants. Exclusion criteria were: History of preterm birth, Women with medical disorders, Bleeding or other signs of miscarriage and previous history of cervical surgery.

Procedure

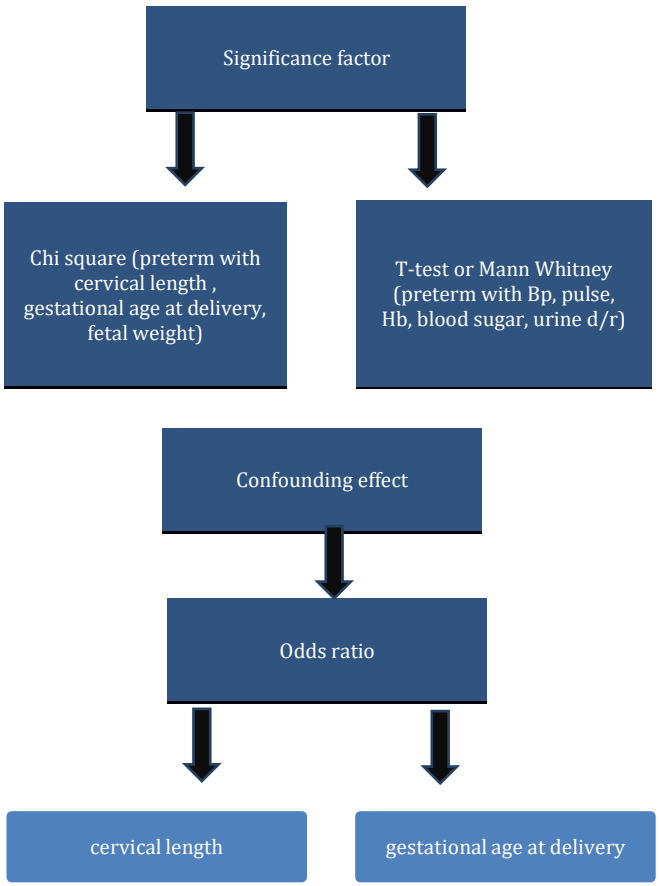
In our setup routine anomaly scan is performed around 20-22 weeks of gestation. Transvaginal ultrasound for the measurement of cervical length was performed along with the anomaly scan without any additional charges by our senior radiologists. The image of the cervix fulfilled 5 quality criteria:

1. The cervix occupies atleast 75% of the screen.
2. The anterior and posterior lips of cervix should be of equal thickness.
3. Full length of endocervical canal should be clearly seen.
4. Inner and outer cervical os should be clearly seen.
5. Calipers should be positioned correctly at internal and external os.

All cervical length measurements saved as electronic as well as two hard copies, one attached with the questionnaire the other with anomaly scan.

Statistical Analysis

The data was entered and analyzed in SPSS version 21.3. Categorical variables like age, addiction, education, conception were expressed as frequencies and percentages while quantitative variable like BMI, gestational age at delivery were expressed as mean+/- standard deviation.



RESULTS

During the study period 51 patients were included in the study who underwent transvaginal ultrasound along with anomaly scan (20-24). The demographics are mentioned in table. 1. and table.2 shows relationship of cervical length with gestational age at delivery, fetal weight and NICU admission. Maternal educational level and age had no effect on cervical length and preterm labor.

Preterm birth was found in 3.9% (2/51) of pregnant women but both of them had cervical length >25mm (31mm and 35mm). This finding is evident of the importance of cervical length of other than 25mm. Short cervix was found in 0% (0/51) of pregnant women. There is weak co relation between standardized short cervical length and gestational age at delivery.

Table 1
Relationship of Cervical Length with Demographics

		Cervical Length		
		≤4	>4	P value
Age		27.38±5.4	27.47±4.5	0.947
Conception	Spontaneous	12(75%)	27(75%)	1.00
	Conceived on tx	4(25%)	9(25%)	1.00
BMI	Underweight	2(12.5%)	2(5.6%)	0.847
	Normal	9(56.3%)	23(63.9%	0.847
	Overweight	4(25%)	9(25%)	0.847
	Obese	1(6.3%)	2(5.6%)	0.847
Education	Matric	0(0%)	1(2.8%)	0.786
	Intermediate	4(25%)	8(22.2)	0.786
	Graduate	12(75%)	27(75%)	0.786

Table 2
Relationship of Cervical Length with Primary and Secondary Outcomes

		Cervical Length		
		≤4	>4	P Value
Gestational Age at Delivery	34-36	2(12.5%)	2(5.5%)	0.654
	>37	14(87.5%)	34(94.4%)	0.654
Fetal Weight	<2	0(0%)	1(2.8%)	0.516
	2-2.5	4(25%)	6(16.7%)	0.516
	2.6-3	7(43.8%)	11(30.6%)	0.516
	>3	5(31.3%)	18(50%)	0.516
NICU Admission	YES	6(37.5%)	14(38.9)	0.924
	NO	10(62.5%)	22(61.1%)	0.924

DISCUSSION

The aim of second trimester cervical length screening is to reduce the number of preterm births by offering prophylaxis to women identified as being at high risk. The strength of transvaginal cervical length measurement is its safety and accessibility. Being non-invasive, well-tolerated, it lends itself well to both screening and follow-up. Despite of efforts to prevent preterm birth, birth rate <37 weeks is still rising. Short cervix (<25mm) is an important predictor for preterm birth in asymptomatic pregnant women. Studies in China have reported that the incidence of preterm birth varies from 5.4% to 13.1%.[15.] The evidence supports the use of cervical length as a robust, non-invasive biomarker for identifying pregnancies at risk for preterm birth.

Study conducted by paul guerby et al. in Canada 2021 had made their own cervical length cut-off of 30 mm (instead of 25 mm), used to identify nulliparous women at high risk of preterm birth[16].

The result of present study shows no patient with short cervix. But there was unusual finding that 2 patients who had normal cervical length (31mm and 35mm) but presented in labour before 37 weeks of gestation and none of the baby got admitted in NICU. Incorporating cervical length into risk assessment models that combine clinical history, biochemical markers, and imaging could further refine the predictive framework for spontaneous preterm birth.[17]

Strengths and Limitations

Strength of the study was minimal loss to follow up, easy communication with radiological department, none of the patient refuse for transvaginal ultrasound. Limitation was low sample size. If the sample size was more we could have screened more population.

CONCLUSION

Universal screening for preterm deliveries by transvaginal ultrasound measurement at 20–24 weeks is feasible and well accepted by pregnant women, but not only all women with short cervix have increased risk of preterm birth but also women with normal cervical length have risk. We have found weak correlation between cervical length and gestational age at delivery.

*Authors' Contribution

Maira Mushtaq: Study design, data collection, data analysis and manuscript writing.
Alia Bano: Research supervision, help in data collection and manuscript approval.
Samina Saleem, Kaneez Fatima, Ayesha Hussain: Data collection.
Bushra: Statistical analysis.

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