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PREDICT PRETERM BIRTH BY TRANSVAGINAL SONOGRAPHIC MEASUREMENT OF CERVICAL LENGTH IN THIRD TRIMESTER

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ABSTRACT

Preterm birth was a major cause of perinatal mortality and morbidity in developed country as well as developing country. We **aimed** to study relationship between cervical length measured by Transvaginal sonographic (TVS) and risk of preterm delivery. **Methodology**: In this prospective study of 150 symptomatic antenatal women with gestational age of 28-37 weeks were recruited; as they came due to treat of preterm birth in third trimester by Transvaginal sonographic in Imam Khomeini hospital, Ahvaz city, 2013.The cervical length of pregnant women has divided into five groups; 1- cervical length ≤ 15 millimetre, 2- cervical length 16-19 mm, 3- cervical length 20-24 mm, 4- cervical length 25-29 mm, 5- cervical length ≥ 30 mm. Data was entered and analysed using SPSS (version 19). P-value of 0.05 was considered statistically significant. In the unvaried analysis, relative risk with 95% confidence interval has been used. Results: The mean age of patients was 28.26yars old. Relative risk in different groups of cervical length of ≤15mm, 16-19 mm, 20-24 mm,25-29 mm, ≥ 30 mm were 14, 9.8,6.12, 3.04 respectively. There was significant

difference between these group and preterm birth (p<0.0001). **Conclusion**: Cervical length measurement by Transvaginal sonographic in third trimester is one of the most effective screening methods for prediction of Preterm birth. The finding has demonstrated strong relative risk between a short cervical length and preterm delivery.

Keywords: Cervical length, preterm birth, Transvaginal sonographic.

INTRODUCTION

Preterm birth (PTB) still remains a major Health problemin world [1]. The cervix has to open to allow vaginal birth. Ultrasound has now shown that this lower partof uterus begins to show changes weeks before eventual birth. Only transvaginal ultrasound should be used to evaluate the cervix for prediction of preterm birth (PTB). The shortest best cervical length (CL) is the most effective measurement for clinical use. Transvaginal sonographic measurement of the cervix is a reliable alternative method for the assessment of cervical length as it allows best quality and more accurate visualization of the uterine cervix [2,3].

Cervical length is most accurately measured by transvaginal ultrasound examination and it has an inverse relationship with the risk of preterm birth [4-6]. Transvaginal sonography had shown that subjects who had delivery at term, the cervical length was fixed during the first 30 weeks, but shortens progressively in the third trimester [7,8]. A study have shown reported that cervical assessment by transvaginal sonography may be useful in the prediction of preterm delivery [9].

In several studies had demonstrated relationship between low cervical length measurement by tranvagainal sonographic and risk of preterm delivery[10-12]. A systematic review had reported different cutoff points for cervical length measurements, which mighttheoretically enable identification of up to 100% of PTBs [13].

The aim of this study was to assess cervical length measurement at 28-37 weeks of gestational by transvaginal sonography on unselected pregnant women in third trimester and correlate these measurements with the preterm delivery.

METHODOLOGY

In this prospective study of 150 symptomatic antenatal women with gestational age of 28-37 weeks were recruited; as they came due to treat of preterm birth in third trimester. The study was conducted at Imam Khomeini hospital under Ahvaz Jundishapour University of Medical

Sciences, Ahvaz, Iran in 2013. Clearance was sought from Ahvaz Jundishapour University of Medical Sciences Ethics Committee; informed consent was signed by the subjects. Their gestational age was confirmed from their menstrual history and measurement of the fetal crown-rump length at the first trimester scan. Inclusion criteria were considered to be: singleton pregnancy, sonographic confirmation of gestational age between the 9th and 12th weeks by crown-rump length measurement, non-smoker, no medical disorder and no factors predisposing to preterm labor such as; previous preterm delivery, Surgery on cervix and preeclampsia. Exclusion criteria were: vaginal bleeding, history of surgery on uterus, placenta previa, placental abruption, onset of labor pains, multiple pregnancy, macrosomia, past history of preterm birth or 2^{nd} trimester abortionand fetal malformation at the 20 week anomaly scan and patient's disapproval.

Transvaginal sonography was performed on an empty bladder and was placed in the dorsal lithotomy position. Transvaginal sonography using a phased convex multi-frequency (3.38- to 11.25-MHz) probe with a 200° aperture angle (EUB-8000 Astro; Hitachi Medical Corporation of America, Tarrytown, NY) was carried out by a single experienced sonographer (DG). The intraobserver variance of cervical sonographic measurements was 2.9%.

As suggested by Burger et al[14], 4 guidelines were followed to obtain reproducible cervical length measurements: (1) the internal os was to be either flat or an isosceles triangle; (2) the whole length of the cervical canal was to be observable; (3) a symmetric image of the external os was to be obtainable; and (4) the distance from the surface of the posterior lip to the cervical canal was to be equal to the distance from the anterior lip to the cervical canal. These guidelines made it possible to improve the interobserver coefficient of variation from 7.1% to 3.3%.

In addition, when curvature of the cervix was present, the measurement was broken down into 2 or more segments, making it easier to correctly estimate the whole length of the cervical canal. In all cases, the measurement was the mean of 3 different measurements taken in quick succession.

The cervical length of pregnant women has divided into five groups;

1- cervical length $\leq$ 15 millimetre
2- cervical length 16-19 mm
3- cervical length 20-24 mm

4- cervical length 25-29 mm

5- cervical length≥ 30 mm

Data was entered and analysed using SPSS (version 19). P-value of 0.05 was considered statistically significant. In the unvaried analysis, relative risk with 95% confidence interval has been used.

RESULTS

In this study 150 antenatal women with gestational age of 28-37 weeks as they came due to treat of preterm birth in third trimester, has shown that mean age of subjects was 28.26 years with average of (15-40) years old. Mean length of cervix by Trans Vaginal Sonography (TVS) was 32 mm with average (9-45) mm. Mean birth weight was 2900gr with highest range of 3500gr and lowest range of 1200 gr. Mean of gestational age of subjects was 32.6 weeks with average of (28-37)weeks.

All subjects based on cervical length (CL) by TVS had divided into 5 groups, that results of them has shown according number of preterm delivery in table 1. This results have found that between CL and preterm birth there is significant difference (p<0.001).

Table 1: Category of cervical length and time of delivery.

Categories	Time of delivery				Total	p-value
	Term		Preterm			
< 15 mm	0		3	100%	3	
16-19 mm	3	30%	7	70%	10	
20-24 mm	9	56.2%	7	43.7%	16	
25-29 mm	18	78.3%	5	21.7%	23	
>30 mm	91	92.8%	7	7.1%	98	
Total	121	80.6%	29	19.3%		<0.0001

Table 2: Born weight and time of delivery.

Time of delivery		Mean of weight	p-value
Term	121	3151.65	<0.0001
Preterm	29	2072.41	

Table 3: Relative risk of preterm in categories of cervical length.

Cervical length	Relative Risk
<15 mm	14
16-19 mm	9.8
20-24mm	6.12
25-29 mm	3.54

4: Sensitivity and Sensitivity Cut of Point of Cervical length

Cut of Point	Sensitivity	Specificity
(< 9)	0	100
(< 12)	3.33	100
(< 14)	6.67	100
(<16)	10	100
(< 17)	13.33	100
(< 18)	26.67	100
(< 19)	33.33	98.33
(< 20	33.33	97.5
(< 22)	36.67	97.5
(< 23)	43.33	97.5
(< 24)	50	94.17
(< 25)	56.67	90
(< 26)	63.33	90
(< 27)	66.67	90
(< 28)	70	85.83
(< 29)	73.33	80
(< 30)	73.33	75
(< 31)	76.67	75
(< 32)	83.33	75
(< 33)	93.33	74.17
(< 34)	96.67	72.5
(< 35)	100	65.83
(< 36)	100	55
(< 37)	100	45
(<38)	100	35
(<39)	100	26.67
(<40)	100	19.17
(< 41)	100	12.5
(< 42)	100	10
(< 43)	100	5.83
(< 44)	100	4.17
(< 45)	100	0.83
(> 45)	100	0

In this research, born weight has categorised in tow groups, first group was equal or less than 2500 gr and second group was birth weight more than 2500 gr. Results has shown significant difference between preterm delivery and low birth weight($p<0.001$). In this study have found that those newborn had weight of equal or less than 2500gr was preterm borne and in those newborn which had birth weight of more than 2500gr, only 2.4% of them was preterm borne. This result also has found that relative risk of preterm born in group who had CL less than 15mm was more than others groups which has presented in table 3.

In Table 4, results have shown that cut of point of cervical length from 9-45mm which is showing predict of best cut of point(statistically) is 33mm, because of sensitivity 93.33% and specificity 74.17%.

DISCUSSION

Preterm birth was a major cause of perinatal mortality and morbidity in developed country as well as developing country. In the past, medical efforts had focused on the management of prematurity rather than preventing its occurrence. Despite advances in obstetric care, fewer advances have been made in primary prevention of preterm birth [15, 16]. Transvaginal sonography is a safe and acceptable method for studying the cervix, as it has known well accepted by 99% of women, and pain is reportedly felt in2% of the cases [17]. Sonographically measured cervical length in this population has been shown to be useful for selecting those at higher risk for preterm delivery, which we found that 100% in group<15mmof CL and 70% in CL 16-19 mm , the risk of delivery was inversely related to the sonographic measurement of cervical length, this founding was confirmed by a study from Turkey[18].

A study has done by Moroz and Simhan, cervical length less than 25 mm which has associated with preterm birth, and every 1-mm shortening of the cervix on sonography indicates a 3% increase in the odds of preterm birth [19]. Another study reported that a cervical length less than 15 mm at 23 gestational weeks is inversely correlated with delivery before 33 weeks [20]. A study ofwomen with a cervix less than 15 mm has a 50% risk of preterm birth [21]. Measurement of cervical length has been used effectively to identify the possibility of spontaneous preterm birth in women at high risk. However, there is a controversy over whether transvaginal assessment is necessary for all pregnant women, including those with a low risk of preterm birth. All of the studies have confirmed our study which preterm birth was significantly associated with short cervical length and relative risk of

preterm birth in group who had CL less than 15mm was more than others groups. Therefore our founding has supported Werner study [22] which hadreported that universal cervical length screening and prevention with progesterone are useful for prevention of preterm births and for cost savings [23,24].

A study has investigated cervical length at 11–14 and 22–24 weeks gestation in an unselected group of pregnant women and correlated the measurements with time of delivery [25]. They found that cervical length at 11–14 weeks was not significantly different between the women who delivered at term and those who delivered at preterm. However, the evaluation at 22–24 weeks found that cervical length was significantly shorter in the preterm delivery group than in those who had a term delivery. This study had demonstrated that transvaginal ultrasonography measurement of a shortened cervical length from the first to the second trimester of pregnancy was significantly associated with the risk of preterm delivery. This study also was confirm with our study which had done transvaginal ultrasonography in third trimester during 28-37 weeks and found significant association between shorten cervical length and preterm delivery.

Taipale and Hiilesmaa [26] investigated a selected obstetrics population at 18–22 weeks gestation and found an eight-fold increase in preterm delivery before 35 weeks associated with a cervical length of 29 mm. They compared different cut-off points; as the cut-off point increased, the sensitivity increased, while the specificity and positive-predictive value decreased. In a study, based on the ROC curve, the cut-off point giving the highest sensitivity and specificity was 27 mm at the 20–24-week scan and this cut-off point was associated with a significantly increased risk of preterm delivery [27]. The findings of this study demonstrate that cut-off point of cervical length from 9-45 mm which was showing predict of the best cut-off point(statistically) is 33 mm, because of sensitivity 93.33% and specificity 74.17%.

CONCLUSION

Cervical length measurement by TVU in thirdtrimester is one of the most effective screening methods for prediction of Preterm birth. The finding of this study has demonstrated strong relative risk between a short cervical length and preterm delivery.

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