



A STUDY OF MIDTRIMESTER MEASUREMENT OF CERVICAL LENGTH BY TRANSVAGINAL USG AS PREDICTOR OF PRETERM LABOR

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ARTICLE INFO

Article History:

Received 7th March, 2017

Received in revised form 20th

April, 2017

Accepted 12th May, 2017

Published online 28th June, 2017

Key words:

Cervical length, midtrimester, preterm labour, transvaginal sonography.

ABSTRACT

Objectives: To assess the predictive value of length of cervix as indicator of preterm labour and to study other high risk factors associated with preterm labour.

Material and method: 100 pregnant women coming to OPD in the Gynaecology & Obstetrics department at our institution for routine antenatal check up were included in the study. After taking informed consent their cervical length was measured at 20-24 weeks using TVS with Philips HD-3 Ultrasound machine using intracavitary probe with frequency of 7-10MHz. The cervical length at 20-24 weeks was correlated with gestational age at delivery and the predictive value of the same was determined.

Results: 21 percent women delivered preterm. In those who delivered preterm it was 2.84cm while mean cervical length of women delivering at term was 3.72cm. The difference was found to be statistically significant (p value <0.05). Cervical length of ≤ 30 mm has good sensitivity (57.1%). At the cut off value of ≤ 25 mm sensitivity was 33.3%, specificity was 100%, PPV came out to be 100% and NPV 84.9%.

Conclusion: Cervical length measured by transvaginal ultrasonography at 20-24 weeks is a useful and significant predictor of gestational age at delivery. The high negative predictive value avoids unnecessary interventions such as tocolysis and cerclage in high risk pregnancies.

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INTRODUCTION

Preterm delivery is a major challenge faced by obstetricians worldwide as it is the leading cause of perinatal and neonatal mortality and morbidity. ACOG has defined preterm labour as onset of labour prior to completion of 37 weeks of gestation, after the attainment of period of viability.^[1]

Global incidence of preterm labour is approximately 9.6%. In India this incidence is 11-14%.^[2] Despite significant advances in perinatal medicine preterm babies predominantly suffer not only from the immediate complication of prematurity such as RDS, apnoea, and PDA but also from long term neurodevelopment disabilities. Hence attempts should be made to prevent preterm labour and this is possible only if preterm labour is predicted well in time; therefore study of various factors for prediction of preterm labour is important.

Prediction of Preterm Labour

Detailed history and examination of all the risk factors like h/o prior preterm birth, low socioeconomic status, young maternal age, low BMI, strenuous physical activity, less interpregnancy interval etc.^[1,3]

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Home uterine activity monitoring (HUAM) can be done using a light weight external tocodynamometer which is to be placed over the abdomen twice daily for one to two hours but ACOG (2012) states that no contraction pattern efficiently predict preterm birth and does not recommend it for clinical use.^[4]

Foetal fibronectin assay - Presence of fFN glycoprotein in cervicovaginal secretions from 24-34 wks is a predictor of preterm labour. Values exceeding 50ng/ml are considered positive. Contamination of sample by amniotic fluid and maternal blood should be avoided so it is of limited value in females with LPV/BPV.^[5]

Cervical length measurement by TVS - Cervical length is one of the major determinants of preterm delivery. The risk of preterm birth varies inversely with cervical length at 20-24 weeks. Since the risk of preterm birth increases markedly when the cervix is <2.5 cm, this measurement is considered as the threshold to define the risk of premature birth. The shorter the cervical length cut-off the higher the positive likelihood ratio (LR) of spontaneous preterm birth.

Cervix can be assessed digitally or by ultrasound. Digital examination of cervix is subjective, suffers interobserver variability and tends to underestimate the actual cervical length because of inability to assess supravaginal portion of

cervix. Ultrasound is more accurate and superior modality to assess the length of cervix. It captures the cervix in a passive state, whereas during digital examination, touching the cervix will stretch it to a variable dilatation.^[6]

Ultrasound evaluation of cervix can be done via trans abdominal, transvaginal and transperineal scan. Transabdominal scan requires a full bladder and this may result in falsely increased cervical length. Also transabdominal scan has poorer resolution due to maternal obesity, fetal parts obscuring vision and lower frequency transducers.^[7] Transperineal approach has the disadvantage that cervix may be obscured by shadowing from the bowel gas or the pubic symphysis.^[8] Transvaginal ultrasonography of cervix is the reference standard technique for accurate determination of dimensions of uterine cervix. When performed by trained operator, cervical length analysis using TVS is safe, highly reproducible, and more predictive than TAS (ACOG 2012). For cervical examinations it is superior in preference to other technique as higher frequency transducer, close proximity to structures studied allows better resolution.^[9] Ultrasound assessment of cervical length has therefore become an important component of obstetric scan. The present study was done to find the predictive value of midtrimester cervical length measurement for preterm labour.

Aims and Objectives

The aims of the study were

1. To assess the predictive value of mid trimester measurement of length of cervix by TVS as predictor of preterm labour.
2. To study other high risk factors associated with preterm labour.

MATERIAL AND METHOD

A prospective observational study was conducted in the Department of Obstetrics and Gynaecology and Department of Radio diagnosis, Government Medical College & Rajindra Hospital, Patiala.

Inclusion Criteria

- Singleton live pregnancy regardless of parity.
- Women between gestational age of 20-24 weeks.

Exclusion Criteria

- Congenital foetal anomalies.
- Multiple pregnancy.
- Women with history of bleeding P/V
- Women with previous surgery on cervix like conisation etc.

100 women with singleton live pregnancy regardless of parity attending the OPD in midtrimester period (20-24 weeks) for routine antenatal check up were included in the study. After taking informed consent their cervical length was measured using TVS. The length of endocervical canal was measured from histological internal os to the notch made by external os (fig 1). If a funnel was present, the cervical length was measured as the distance between the upper and the lower ends of the closed segment of the endocervical canal.

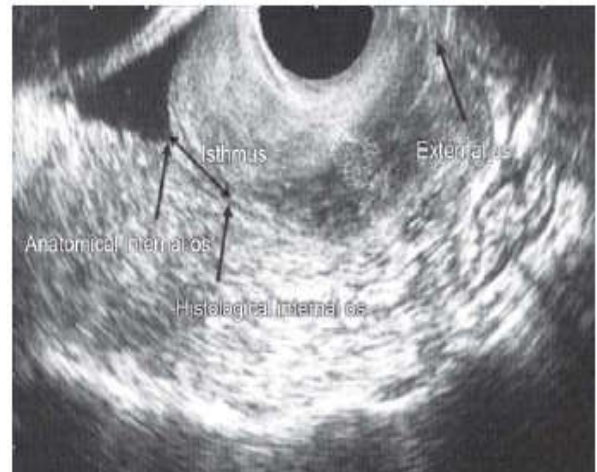


Fig 1

After measuring the cervical length the women were followed up until they delivered. The mean cervical length at 20-24 weeks was correlated with gestational age at delivery and the predictive value of the same was determined.

Various other factors affecting gestation age at delivery were also studied.

Observations

The mean age of women in study was 24.46±3.45 years with majority of the women (53%) in age group 21-25 years. 53% of women lived in rural area while 47% were from urban area. In the study, 47% of women were nulliparous and 53% were multiparous. Majority of women (50%) belonged to upper lower class while only 2% were from upper class. Maximum women (71%) had normal BMI (18.5-22.9 Kg/m²) while 6% were underweight and 5% were obese. The mean BMI was 20.88±2.09 Kg/m² (Table 1)

Majority of the women (61%) had cervical length from 3.6-4cm at 20-24 weeks. None has cervical length <1.5 cm while 4% of the women had cervical length >4 cm. The mean cervical length at 20-24 weeks was 3.54±0.50 cm (Fig 2).

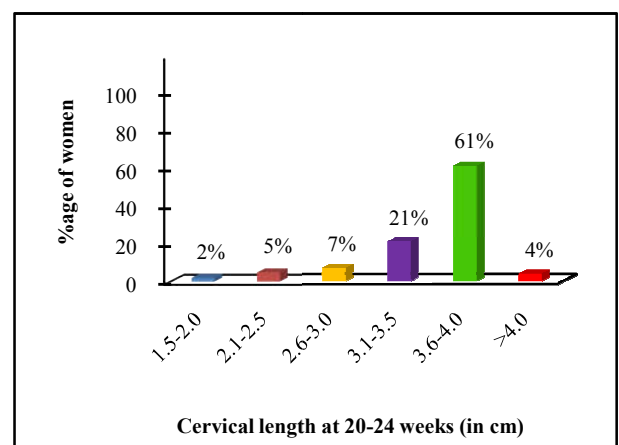


Fig 2 Distribution according to cervical length at 20-24 wks

21% of the total women delivered preterm while 79% had term delivery. Mean cervical length at 20-24 weeks in the women who delivered preterm (2.84 ± 0.58cm) was significantly less (p value <0.001) than those who delivered at term (3.72 ± 0.27cm).

Mean gestational age at the time of delivery for women with cervical length ≤2.5 cm at 20-24 weeks was 30.04 weeks

while it was 37.62 weeks for those having cervical length >2.5 cm (p value <0.001). At cervical length cut off of ≤2.5 cm, all 7 women delivered preterm and 85.7% of them delivered even before 32 weeks. While at cervical length cut off of ≤3cm, 42.9% women delivered before 32 weeks and the same proportion delivered between 32 to <37 weeks. Mean gestational age at the time of delivery show increasing trend with increase in cervical length at 20-24 weeks. With increase in cervical length at 20-24 weeks, the number of women delivering preterm decreases and the average gestational age increases (fig 3).

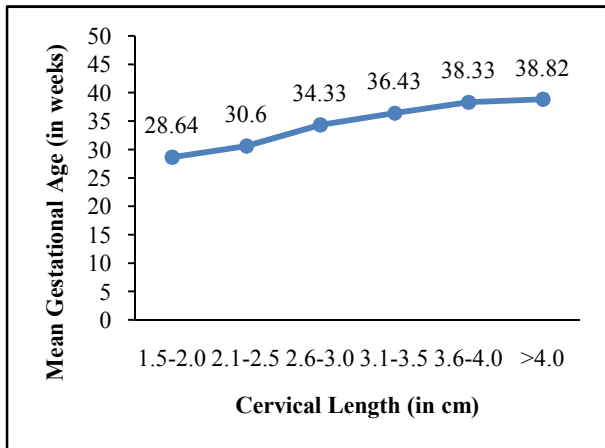


Fig 3 Correlation of Cervical Length at 20-24 Weeks With Mean Gestational Age At Delivery

70% of women with prior preterm birth delivered preterm again, thus making the prior preterm birth an important predictor of preterm delivery (p value <0.001). Mean cervical length at 20-24 weeks of women with prior preterm birth (2.96 cm) was significantly less (p value 0.003) than those without prior preterm birth (3.48 cm). This signifies the importance of early screening for short cervical length in women with prior PTB.

The study found no association of age, residential status, parity, socioeconomic status, BMI, interval from previous pregnancy or medical complications with preterm delivery which may be due to small number of women in study belonged to extreme groups (Table 1).

Out of 100 women, 95 delivered vaginally and their mean cervical length at 20-24 weeks was 3.51 cm while 5 of women who went in spontaneous labour landed up in LSCS and their mean cervical length at 20-24 weeks was 4.06 cm. Thus mean cervical length at 20-24 weeks of those delivered by LSCS was significantly higher (p-value < 0.001) than the mean cervical length of those who delivered vaginally thus signifying the importance of cervical length for predicting mode of delivery.

Cervical length of ≤2.5 cm when measured by TVS at 20-24 weeks predicts preterm birth with a sensitivity of 33.3%, specificity-100%, PPV-100% and NPV- 84.9%. Diagnostic accuracy at this cut off was 86% while cervical length of ≤3.0 cm had a sensitivity of 57.1%, specificity - 90.75%, PPV - 85.7%, NPV - 91.7% and diagnostic accuracy of 89% in predicting preterm birth. We found that as the cut off value for cervical length was increased the sensitivity increased thus detecting more women at risk of preterm delivery though specificity and PPV decrease.

When comparing the neonatal outcomes of babies delivered average birth weight of preterm babies (1647.86 gm) was significantly less (p value <0.001) than that of term babies (2724.43 gm). Prematurity is found to be a major contributor to NICU admission (75%, 12 out of 16) and early neonatal mortality (100%, all 4). The association of prematurity with NICU admission and early neonatal death was highly significant statistically (p value <0.001).

DISCUSSION

Globally, preterm birth is the single largest cause of neonatal deaths and major cause of perinatal morbidity and mortality.

Table 1 Association of various maternal characteristics with preterm labour

Maternal Characteristics		Total	Preterm	Term	p-value	Strength of association
Age (in Years)	≤ 20	13	2 (15.4%)	11 (84.6%)	0.465	NS
	21 - 25	53	9 (17%)	44 (83%)		
	26 - 30	29	8 (27.6%)	21 (72.4%)		
	> 30	5	2 (40%)	3 (60%)		
Residential status	Rural	53	12 (22.6%)	41 (77.4%)	0.669	NS
	Urban	47	9 (19.1%)	38 (80.9%)		
Parity	Nulliparous	47	8 (17%)	39 (83%)	0.358	NS
	Multiparous	53	13 (24.5%)	40 (75.5%)		
Socioeconomic status	Upper (I)	2	1 (50%)	1 (50%)	0.15	NS
	Upper middle (II)	18	2 (11.1%)	16 (88.9%)		
	Lower middle (III)	27	4 (14.8%)	23 (85.2%)		
	Upper lower (IV)	50	12 (24%)	38 (76%)		
	Lower (V)	3	2 (66.7%)	1 (33.3%)		
BMI (in Kg/m ²)	< 18.5	6	3 (50%)	3 (50%)	0.137	NS
	18.5-22.9	71	16 (22.5%)	55 (77.5%)		
	23-24.9	18	2 (11.1%)	16 (88.9%)		
	≥ 25	5	0 (0%)	5 (100%)		
Prior preterm birth	Present	10	7 (70%)	3 (30%)	<0.001	HS
	Not present	43	6 (14%)	37 (86%)		
Interval from previous pregnancy	< 1.5 years	16	5 (31.2%)	11(68.8%)	0.455	NS
	≥1.5 years	37	8 (21.6%)	29 (78.4%)		
Medical complication	Anaemia	68	15 (22.1%)	53 (77.9%)	0.705	NS
	Preeclampsia	4	2 (50%)	2 (50%)	0.146	
	Hypothyroidism	2	0 (0%)	2 (100%)	0.461	
	Gestational diabetes	1	0 (0%)	1 (100%)	0.604	
	Genitourinary infections	2	1 (50%)	1 (50%)	0.309	

Predicting spontaneous preterm birth will help in early intervention and improvement in outcome. Numerous investigators have developed risk scoring systems but there is no reduction in rate of preterm birth in general population. Assessment of maternal history alone misses significantly more than half of women at risk for preterm birth. Progressive cervical changes are usually established before dilatation of external os and can begin as early as 16-24 weeks of gestation in patients who eventually deliver preterm. Many studies have shown that cervical length measured by TVS is, safe and more accurate method than digital examination or transabdominal or transperineal ultrasound. Thus cervical length assessment by TVS provides a better screening tool to predict which women are at risk for preterm birth. A short cervix at ultrasonography has been reported as an independent predictor of preterm delivery.

In present study we assessed the predictive value of cervical length by TVS at 20-24 weeks. We also evaluated relationship of potential risk factors for spontaneous preterm birth but found relatively few significant associations.

Mean cervical length in our study was found to be 3.54±0.50 cm which is comparable to other studies by other authors.^[10-14] Incidence of preterm delivery in present study was 21 % which was almost similar to other studies.^[13,15,16] In our study the mean cervical length at 20-24 weeks in those delivering at term was 37.2 mm and in those delivering preterm was 28.4 mm. The difference was found to be statistically significant as reported by other authors.^[10,16,17,18]

Our study found a statistically significant correlation between prior preterm birth with preterm delivery in present pregnancy similar to study done by Dalili *et al* (2013)^[10] whereas some other studies like that of Tsoi *et al* (2003)^[19] and Shinde *et al* (2015)^[20] found the association non significant. In the present study mean cervical length at 20-24 weeks of the women with prior preterm birth was 29.6 mm while it was 34.8 mm in those without prior preterm birth. The difference was found to be statistically significant similar to study by Dalili *et al* (2013).^[10]

In our study 5% patients delivered by abdominal route and their mean cervical length at 20-24 weeks was significantly higher (p value <0.001) than those who delivered by vaginal route as in studies by Arora *et al* (2012)^[12], Kalu *et al* (2012)^[22] and Datta *et al* (2015).^[23] Proportion of preterm and term babies requiring NICU admission was 57.1% and 5.1% respectively and the difference was found to be statistically significant similar to study by Ramchandran *et al* (2016).^[18] In present study 4% babies had early neonatal death and all of them were born preterm. Thus the association of prematurity with neonatal mortality was highly significant statistically (p value <0.001) like in studies by Shinde *et al* (2015)^[20] and Kaur *et al* (2016).^[24]

Table 2 Comparison of Diagnostic Indices for Cervical Length Cut off of ≤25 Mm At 20-24 Wks in Predicting Preterm Labour

Study	Sensitivity	Specificity	PPV	NPV
Berghella <i>et al</i> (2007) ^[21]	14%	97%	50%	82%
Arora <i>et al</i> (2012) ^[12]	31.3%	100%	100%	88.4%
Dalili <i>et al</i> (2013) ^[10]	55.5%	93.6%	51%	98.8%
Tanvir <i>et al</i> (2014) ^[13]	40.6%	96.9%	81.3%	83.3%
Nivedita <i>et al</i> (2016) ^[11]	61.54%	95.4%	66.67%	94.32%
Present study (2016)	33.3%	100%	100%	84.9%

When cervical length cut off of ≤25 mm at 20-24 weeks is taken for predicting preterm labour the Sensitivity, Specificity, PPV and NPV in our study were 33.3%, 100%, 100% and 84.9% respectively. This is comparable to studies done by other authors.^[10,11,12,13,21] (Table 2)

CONCLUSION

In our study we found that short cervical length by TVS at 20-24 weeks is a good predictor of preterm delivery. There is an inverse relation between length of cervix and gestational age at delivery. We also evaluated other risk factors for spontaneous preterm birth and found significant association with prior preterm birth. The study concludes that screening antenatal women by TVS at 20-24 weeks for short cervix is useful to identify the asymptomatic women who are at risk of preterm delivery early enough so that an optimum management can be given in time, also the high NPV helps to avoid unnecessary medications and hospitalisation. The probable drawback is a low sensitivity relating to low prevalence of preterm delivery in low risk population which can be increased by considering a higher cut off for cervical length (≤ 3 cm) and by combining it with other high risk factors like prior preterm birth. But considering the morbidity and mortality associated with prematurity and cost of management of preterm babies, the cervical length measurement by TVS at 20-24 weeks is cost effective and should be offered to all pregnant women.

Bibliography

1. Arias F, Daftary SN, Bhide AG. Preterm labour. In: Practical guide to high risk pregnancy and delivery. (3rd edn.). Elsevier 2012; 217-36.
2. Beck S, Wojdyla D, Say L, Betran AP, Merialdi M, Requejo JH *et al*. The world wide incidence of preterm birth: a systematic review of maternal mortality and morbidity. *Bull World Health Organ* 2010 Jan; 88(1): 31-38.
3. Patwardhan VB. Etiology and Early Diagnosis of Preterm Labour. In: Pregnant at risk current concepts (3rd edn.) FOGSI 2012; 365-68.
4. Cunningham FG, Lenovo KJ, Bloom SL, Spong CY, Dashe JS, Hoffman BL *et al*. Preterm labor. Williams obstetrics. 24th edition. Mc Graw Hill Education; 2014: 829-61.
5. Goldenberg RL1, Iams JD, Das A, Mercer BM, Meis PJ, Moawad AH *et al*. The preterm prediction study: Sequential cervical length and fetal fibronectin testing for prediction of spontaneous preterm birth. National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network. *Am J Obstet Gynecol* 2000 Mar; 182(3):636 - 43.
6. Lim K, Butt K, Crane JM. SOGC Clinical Practice Guideline. Ultrasonographic cervical length assessment in predicting pre-term birth in singleton pregnancies. *J Obstet Gynecol Can* 2011 May; 33(5): 486-99.
7. Vidaeff AC, Ramin SM. From concept to practice: the recent history of preterm delivery prevention. Part I: cervical competence. *Am J Perinatol* 2006 Jan; 23(1):3-13.
8. Ozdemir I, Demirci F, Yucel O. Transperineal versus transvaginal ultrasonographic evaluation of the cervix at each trimester in normal pregnant women. *Aust N Z J Obstet Gynecol*. 2005 Jun;45(3): 191-4

9. Whittle WL, Fong KW, Windrim R. Cervical Ultrasound and Preterm birth. In: Diagnostic Ultrasound Rumack CM, Wilson SR, Charboneau JW, Levine Deds. 4th edn Philadelphia: Elsevier Mosby. 2011:1528-30.
10. Dalili M, Meybodi MK, Ghaforzadeh M, Farajkhoda T, Vardanjani HM. Screening of preterm labor in Yazd city: transvaginal ultrasound assessment of the length of cervix in the second trimester. *Iran J Reprod Med* 2013 Apr; 11(4):279-84.
11. Nivedita, Patil S, Patil SK, Patil Y, Kshisagar NS, Garg A *et al*. Predictive value of transvaginal sonographic cervical length at 18-24 weeks gestation in preterm labor in primigravida. *International Journal of Recent trends in Science and Research*, 2016 Apr; 18(3):394-9.
12. Arora P, Maitra NK, Agarwal S. Cervical length measurement by transvaginal ultrasound at 20 to 24 weeks gestation and the timing and mode of delivery. *J South Asian Feder Obst Gynae* 2012; 4(1):22-24.
13. Tanvir, Ghose S, Samal S, Armugam S, Parida P. Measurement of cervical biometry using transvaginal ultrasonography in predicting preterm labor. *Journal of Natural Science, Biology and Medicine*, July 2014; 5(2):362-72.
14. Bhonsale D, Jaisal P. Cervical Evaluation By Transvaginal Ultrasonography as a predictor of preterm labour. *Int Arch of BioMed Clin Res*. 2016; 2(3):93-5.
15. Kore SJ, Rao S, Bhagwat A, Gujarathi P, Ambiyee VR, Badhwar VR. Prediction of preterm labor by transvaginal sonography. *Bombay Hospital Journal*, 2004 July; 16(3).
16. Lakhani PD, Bhansode AS, Nanawati MS, Desai SV. Role of cervical length as predictor of preterm labor and a comparison of transabdominal versus transvaginal ultrasound in determining the accuracy of cervical length. *South Asian Federation of Obstetrics and Gynecology*, May-August 2010; 2(2):129-31.
17. Gamze C, Cigdem S, Senol K, Filiz A. Evaluation of the length of the cervix by transvaginal and transabdominal ultrasonography in the second trimester. *J Obstet Gynecol India* 2005; 55(4):318-21.
18. Ramachandran L, Salam A. A comparison of the predictive value of transvaginal cervical length at 11-14 weeks and at 18-22 weeks of gestation in preterm labour. *Indian Journal of Obstetrics and Gynecology Research* 2016; 3(3):253-6.
19. Tsoi E, Akmal S, Rane S, Otigbah C, Nicolaidis KH. Ultrasound assessment of cervical length in threatened preterm labor. *Ultrasound Obstet Gynecol*. 2003; 21(6):552-5.
20. Shinde GR, Kshisagar N, Laddad M, Patil SK. Prediction of preterm delivery by assessment of cervical length using transvaginal ultrasound. *Journal of Evolution of Medical and Dental Sciences*, 2015 May; 4(37):6361-71.
21. Berghella V, Roman A, Daskalakis C, Ness A, Baxter JK. Gestational age at cervical length measurement and incidence of preterm birth. *Obstet Gynecol*. 2007 Aug; 110(2 Pt 1):311-7.
22. Kalu CA, Umeora OU, Ekwuatu EV, Okwor A. Predicting mode of delivery using mid-pregnancy ultrasonographic measurement of cervical length. *Niger J Clin Pract* 2012 Jul-Sep; 15(3): 338-43.
23. Datta MR, Parashar S, Mukherjee P, Kumari S and Raut AN. Mid Trimester Transvaginal Ultrasound Assessment of Cervix for Prediction of Primary Caesarean Section. *Open Journal of Obstetrics and Gynecology* 2015 Dec; 15(5): 855-863.
24. Kaur G, Sarbhai V. Predicting preterm labor by cervical length measurement. *Indian Journal of Applied Research*, May 2016; 6(5):89-91.

How to cite this article:

Ramiti Gupta *et al* (2017) 'A Study Of Midtrimester Measurement Of Cervical Length By Transvaginal Usg As Predictor Of Preterm Labor', *International Journal of Current Advanced Research*, 06(06), pp. 4061-4065. DOI: <http://dx.doi.org/10.24327/ijcar.2017.4065.0430>
