



“TRANSVAGINAL ULTRASOUND MEASUREMENT OF CERVICAL LENGTH IN PREGNANT WOMEN BETWEEN 18 TO 24 WEEKS OF GESTATION FOR PREDICTING SPONTANEOUS PRETERM LABOUR”

Gynaecology

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KEYWORDS

INTRODUCTION

Ultrasound assessment of the cervix, in recent decades, has become an important part of obstetric diagnostic imaging, especially since the development of transvaginal probes and the increasing acceptance by patients of transvaginal sonography during pregnancy. Transvaginal sonographic measurement of the cervix is a reliable alternative method for the assessment of cervical length as it allows better quality and more accurate visualization of the uterine cervix.

It has been widely recognized that the early prediction, prevention and/or effective management of preterm labour will improve neonatal outcome and will have a profound impact on society and long-term public healthcare costs.

Preterm labour is defined as the onset of labour in patients before 37 weeks of gestation. The lower limit of gestation is accepted to be 20 weeks in developed countries, but it is 28 weeks in developing countries. Preterm labour complicates 5-10% of pregnancies and is a leading cause of neonatal morbidity and mortality worldwide.

Some of the changes associated with cervical ripening during labor can be detected by digital examination of the cervix. However, endovaginal ultrasound allows the recognition of changes in endocervical canal length and in the diameter and shape of the internal cervical os before they are apparent to the fingers of the examiner. Cervical length is normally distributed and remains relatively constant until the third trimester.

Several studies have reported that cervical assessment on TVS may be useful in the prediction of preterm delivery. It is essential for sonographers to become familiar with the various methods of cervical imaging including transabdominal, translabial and transvaginal approaches.

OBJECTIVES OF STUDY.

- To assess the relation of cervical length measured by transvaginal sonography at mid-trimester in singleton uncomplicated pregnancies and the time of delivery.
- To assess measurement of cervical length by transvaginal sonography in singleton pregnancies between 18-24 weeks of gestation in the prediction of spontaneous preterm deliver

METHODOLOGY

This study was conducted at Adichunchanagiri Hospital & Research Centre Nagamangala (T), Mandya (D). This study was conducted from November 2011 to October 2013 on 300 pregnant women with singleton pregnancies fulfilling the below mentioned inclusion and exclusion criteria.

INCLUSION CRITERIA

- All singleton pregnancies who have the correct dating (reliable LMP in the background of regular menstrual cycles or ultrasound dating done in the first trimester), who came for anomaly scan between 18-24 weeks are included for cervical length measurement with transvaginal ultrasound scanning.

EXCLUSION CRITERIA

- Those who were not willing to give their consent for the

involvement in the study or those not giving consent for transvaginal ultrasound measurement of cervical length.

- Those who developed medical or surgical complications in the later period and got terminated iatrogenically.
- Those who missed follow up

300 booked cases of pregnant women having gestation age between 18-24 weeks with singleton pregnancies coming to Adichunchanagiri Institute of Medical Sciences willing to participate in the study were included after noting their detailed telury including obstetric history, menstrual history, past history, family history and Personal history Genera] physical examination was done including routine obstetric examination. Routine blood investigations such as hemoglobin estimation, CBC,mV. HBSAg, VDRL, OCT and thyroid profile were done. Urine sugar, albumin and microscopy were done. Patient's cervical length was measured by ultrasonography using a 7 MHz transvaginal probe m SIEMENS, ACUSON X300 ULTRASOUND IMAGE SYSTEM during the routine anomaly scan by different qualified sonologists to avoid any bias and they are followed up for the pregnancy outcomesuch as gestational age at the time of delivery, mode of delivery, baby's birth weight and APGAR score etc. The relationship of cervical length on time of delivery was noted.

RESULTS

Study design: An observational clinical study

Table 2 : Age distribution of the study group

Age in years	No. of pregnant Women	%
18-20	73	24.3
21-25	172	57.3
26-30	50	16.7
31-35	2	0.7
36-35	3	1.0
Total	300	100.0

Mean $\pm$ SD: 23.21 $\pm$ 3.10 (Min-max : 18-39)

Median: 23.00

The above table shows, 57.3% of the study group are in the age group of 21-25 years. Median age 23 years. Minimum age of the subject studied being 18 years and maximum being 39 years.

Figure 16: Age distribution of the study group Distribution of age

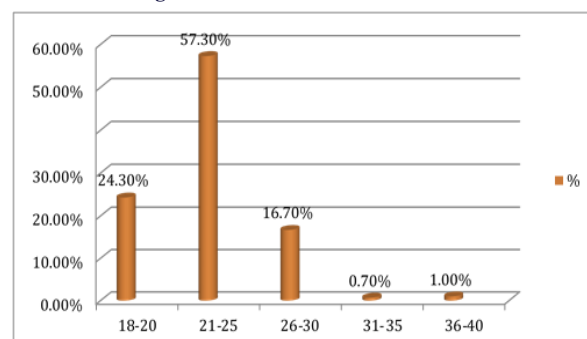
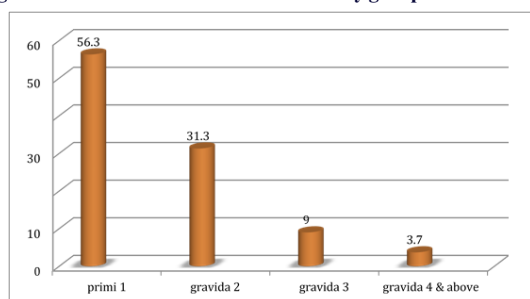


Table : 3 Gravida distribution of the study group

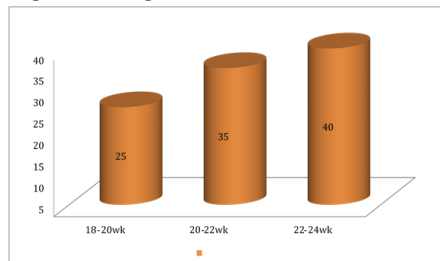
Gravida	No. of pregnant women	%
Primi	169	56.3
Gravida 2	94	31.3
Gravida 3	27	9.0
Gravida 4 and above	11	3.7
Total	300	100.0

The above table shows the gravida distribution of the study group. 56.3% in the study group were primi gravidae , whereas 43.7% were multigravidas.

Figure 17: Gravida distribution of the study group**Table 5 : Gestation age in weeks at the time of scan**

Gestation age	No. of pregnant women	%
18-20 wk	75	25.0
20-22 wk	105	35.0
22-24wk	120	40.0
Total	300	100.0

Above table shows that maximum pregnant women got their scans done between 22-24 weeks of gestation , followed by 20-22 weeks of gestation . mean gestational age at the time of scan being 22 weeks . this was also their anomaly scan.

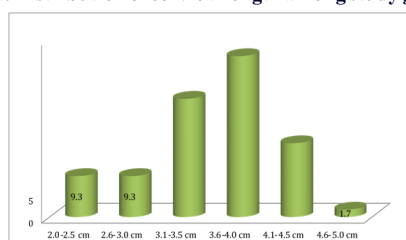
Figure 19 : gestational age in weeks at the time of scan

GESTATIONAL AGE

TABLE 6: DISTRIBUTION OF CERVICAL LENGTH AMONG STUDY GROUP

Cervical length(cm)	No. of pregnant women	%
2.0-2.5 cm	28	9.3
2.6-3.0 cm	28	9.3
3.1-3.5 cm	80	26.7
4.1-4.5 cm	109	36.3
4.6-5.0 cm	50	16.7
Total	300	100.0

Cervical length in the majority of the pregnant women studied was between 3.6 -4.0 cm with mean cervical length being 3.6 cm. Minimum cervical length measured was 2.0 cm and maximum 4.8 cm.

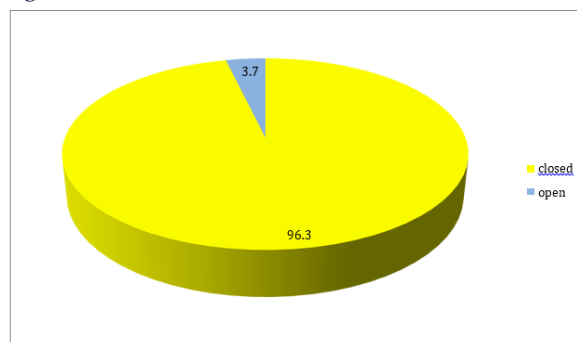
Figure 20: Distribution of cervical length among study group

Cervical length (cm)

Table 7: internal Os

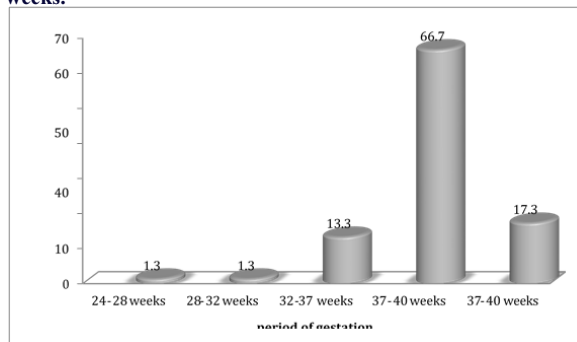
Internal Os	No. of pregnant women	%
Closed	289	96.3
Open	11	3.7
Total	300	100

Above table shows that 3.7% of the women ahd open internal Os at the time of scan.

Figure 21: Internal Os**Table 8: Period of gestation in weeks at the time of delivery**

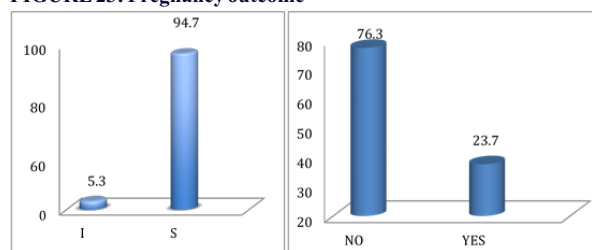
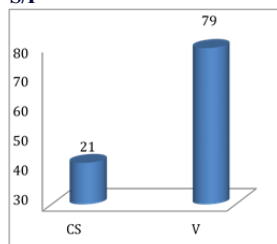
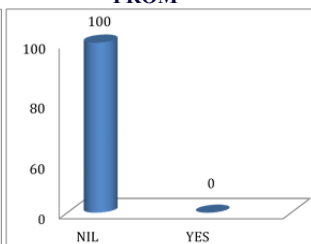
Period of gestation	No. of pregnant women	%
24-28 weeks	4	1.3
28-32 weeks	4	1.3
32-37 weeks	40	13.3
37-40 weeks	200	66.7
40-42 weeks	52	17.3
Total	300	100

Above table shows that maximum number of deliveries occurred between 37-40 weeks of gestation.

Figure 22: period of gestation in weeks at the time of delivery in weeks.**Table 9: Pregnancy outcome**

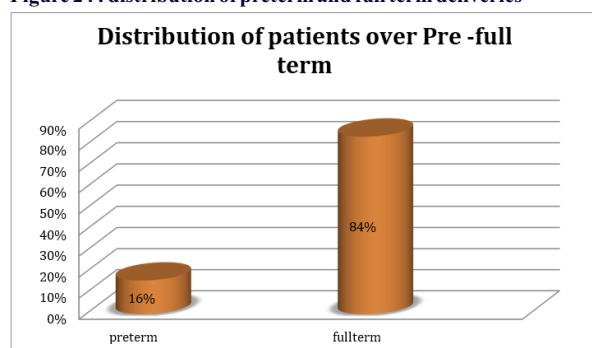
Pregnancy outcome	No. of pregnant women (n=300)	%
S/I		
• I	16	5.3
• S	284	94.7
PROM		
• no	229	76.3
• yes	71	23.7
V/CS		
• CS	63	21.0
• V	237	79.0
complication		
• Nil	300	100.0
• Yes	0	0.0

Above table shows that 94.7% of pregnant women set into spontaneous labour, whereas 5.3% were induced for various reasons. 23.7% of the subjects had pre-labour rupture of membranes. 79% delivered through vaginal route, whereas 21% had to undergo caesarean section for different indications. None of the patients studied had any complications during delivery.

FIGURE 23: Pregnancy outcome**S/I****PROM****V/CS****COMPLICATION****Table 10: Distribution of preterm and full term deliveries**

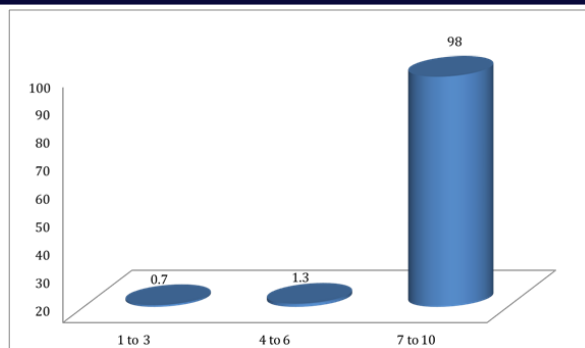
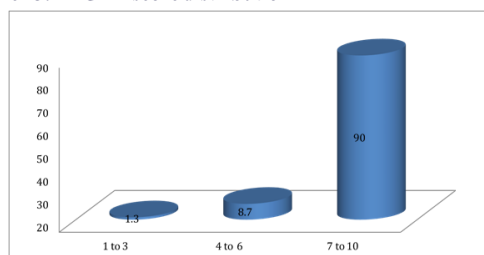
Maturity	No. of pregnant women (n=300)	%
Preterm	48	16.0
Full term	252	84.0
total	300	100.0

Above table shows 84% of the subjects studied underwent full term deliveries, whereas 16% underwent pre-term deliveries.

Figure 24 : distribution of preterm and full term deliveries**Table 11 : APGAR score distribution**

APGAR score	No. of babies (n=300)	%
APGAR at 1 min		
• 1-3	4	1.3
• 4-6	26	8.7
• 7-10	270	90.0
APGAR at 5 min		
• 1-3	2	0.7
• 4-6	4	1.3
• 7-10	294	98.0

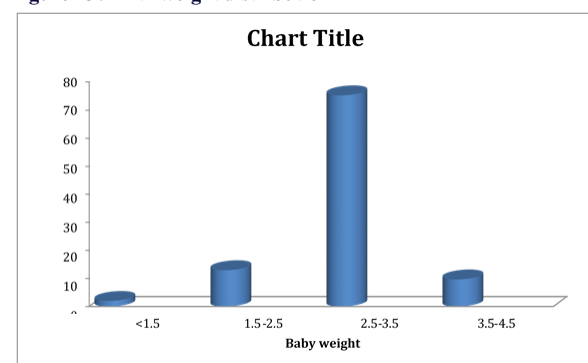
Above table shows that 90% of the babies born had APGAR score of >7 at 1 minute and 98% had APGAR score of >7 at 5 minutes

Figure 25: APGAR score distribution**APGAR 2****percentages Table 12 : Birth weight distribution**

Baby weight (kg)	No. of babies	%
<1.5	6	2.0
1.5-2.5	39	13.0
2.5-3.5	226	75.3
3.5-4.5	29	9.7
Total	300	100

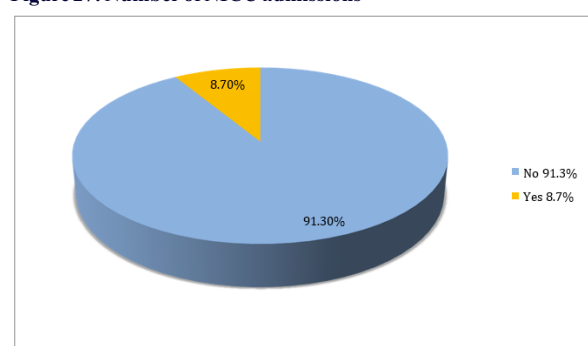
Mean $\pm$ SD : 2.91 $\pm$ 0.54

Majority of the babies born, i.e 75% had birth weight ranging between 2.5kg to 3.5 kg. Mean birth weight in our study group being 2.9 kg.

Figure 28 : Birth weight distribution**Table 13: Number of NICU admissions**

NICU Admission	No. of babies	%
No	274	91.3
Yes	26	8.7
Total	300	100.0

Above table shows that 8.7% of the babies born required NICU care for various indications most commonly for preterm care

Figure 27: Number of NICU admissions**Table 14.4 correlation of cervical length with period of gestation**

Cervical length	Period of gestation				total
	24-32weeks	32-37weeks	37-40weeks	40-42weeks	
2.0-2.5cm	7(87.5%)	19(47.5%)	2(1%)	0(0%)	28(9.3%)
2.6-3.0cm	1(12.5)	6(15%)	21(10.5%)	0(0%)	28(9.3%)

3.1-3.5cm	0(0%)	9(22.5%)	55(27.5%)	16(30.8%)	80(26.7%)
3.6-4.0cm	0(0%)	5(12.5%)	83(41.5%)	21(40.4%)	109(36.3%)
4.1-4.5cm	0(0%)	1(2.5%)	35(17.5%)	14(26.9%)	50(16.7%)
4.6-5.0m	0(0%)	0(0%)	4(2%)	1(1.9%)	5(1.7%)
total	8(100%)	40(100%)	200(100%)	52(100%)	300(100%)

Above table shows the relation of the cervical length on time of delivery. among those who delivered between 24-32 weeks of gestation, 87.5% had cervical length of ≤ 2.5 cms, whereas 100% had cervical length of ≤ 3.0 cms. among those who delivered between 32-37 weeks of gestation, 47.5% had cervical length of ≤ 2.5 cm, whereas 62.5% had cervical length of ≤ 3.0 cm.

Figure 28: Correlation of cervical length with period of gestation

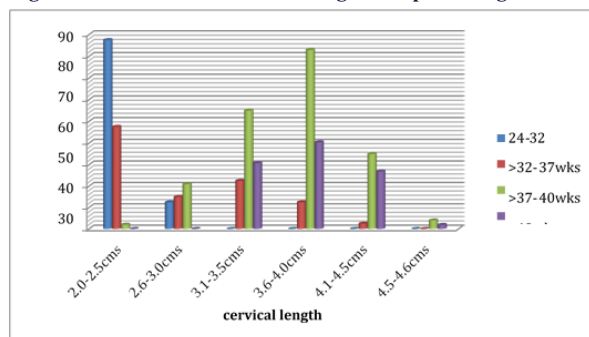
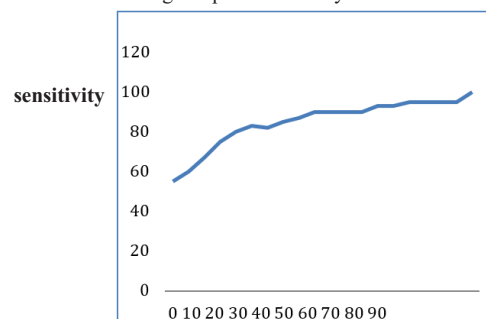


Table 15: correlation of cervical length to predict the preterm in subjects studied

Cervical length	sensitivity	specificity	PPV	NPV	Accuracy	P value
≤ 2.5 cm	54.17	99.21	92.86	91.91	92.08	<0.001**
≤ 3.0 cm	70.59	90.87	61.02	93.85	87.46	<0.001**
≤ 3.5 cm	87.50	62.70	30.88	96.34	66.67	<0.001**

Above table shows diagnostic indices relating to cervical length in prediction of preterm delivery. At the cut-off value of ≤ 2.5 cm, sensitivity is 54.17%, specificity is 99.21%, PPV is 92.86%, NPV is 91.91%, accuracy is 92.08% and P value is < 0.001 . At the cut-off value of ≤ 3.0 cm, sensitivity is 70.59%, specificity is 90.87%, PPV is 61.02%, NPV is 93.85%, accuracy is 87.46% and P value is < 0.001 .

Figure 29 : Receiver operating characteristics curve showing the relationship between sensitivity and false positive at cut-off point of 3.0cm cervical length to predict delivery before 37 weeks of gestation.



CONCLUSION

Our findings confirm those of previous studies that have found an inverse relation between the length of the cervix, as measured by ultrasonography during pregnancy, and the frequency of preterm delivery.

We found that the cervical length measured at 18-24 weeks in asymptomatic women with singleton pregnancies was useful for identifying women at increased risk for preterm delivery.

Mean value of cervical length in pregnant women at 18-24 weeks of gestation in our study was 3.6 cm. There is a definite correlation between short cervical length and occurrence of preterm delivery.

Our data suggest that the length of the cervix is an indirect indicator of its competence and should be seen as a continuous rather than a

dichotomous variable. The length of the cervix is directly correlated with the duration of pregnancy: the shorter the cervix, the greater the likelihood of preterm delivery.

Transvaginal ultrasonography of the cervix during routine anomaly scan is safe, acceptable and a cost-effective test to assess risk of preterm delivery.

Cervical length was more consistently measured than funneling and performed as well as or better than funneling in terms of sensitivity and predictive value.

Further studies should be undertaken to establish whether the best management procedure for screening for prematurity is a single examination in the second trimester or follow-up scans from the first trimester of pregnancy.

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