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Original Research Article

Ultrasonographic measurement of cervical length at 18-24 weeks of gestation as a predictor for preterm labour

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Abstract: This study was undertaken to evaluate the cervical length ultrasonographically at 18 to 24 weeks of gestation in asymptomatic women and predicting risk of preterm labour and delivery. A hospital based prospective study was conducted by enrolling 550 antenatal patients with gestations between 18 and 24 weeks & their cervical length were measured by USG and were followed through their pregnancy, labour and delivery. All the relevant data were recorded, studied & statistically analysed. 40 patients were lost to follow up. Therefore, all the result analyses were done for 510 patients. Majority of the patients belonged to age group 21- 30 years (58.43 %), primigravida (43.00 %), from urban background (68.03 %) , belonged to lower socio-economic status (52.9 %), at 21 weeks of gestation (30.78 %). 338 patients had labour at term (66.29 %), 137 (26.90 %) had preterm & 35 (6.81 %) had post-term labour. With cervical length < 1.5 cm, all 5 patients went into preterm labour (100 %), cervical length 1.5-2.0 cm, 33 patients(94.28 %) went into preterm labour, 2.1-2.5 cm cervical length 51 patients (67.10 %) went into preterm labour, 2.6-3.0 cm 17 patients(15.17%) patients went into preterm labour & in those patients with cervical length > 3.0 cm, 31 (10.99 %) landed up in preterm labour. When statistically analysed, the association between cervical length and gestational age at which labour started was found to be very significant and results showed $\chi^2 = 190.01$, df= 1, P< 0.0001. (Very significant). As the cervical length increases, the median gestational age at which labour started also increases which was found to be significant .(r = 0.98, P< 0.01). Patients with shorter cervices had shorter gestations and went into labour early. Thus ultrasonographic measurement of cervical length at 18-24 weeks of gestation can be utilized as a tool for predicting adverse pregnancy outcome especially preterm labour and delivery.
Keywords: cervical length, cervical encirclage, preterm labour, preterm delivery, pregnancy outcome, ultrasonography

INTRODUCTION:

Preterm birth, whose incidence is approximately 10 % of all live births worldwide [1], despite advances in perinatal care, leads to significant perinatal morbidity and mortality. Preterm birth is responsible for a high neonatal mortality rate of 85 % and even for those who survive, suffer numerous temporary and permanent disabilities as sequelae [2], causing mental, physical or intellectual impairment because of the sequelae of preterm birth on the person, his or her family and the society as a whole. Preterm birth alone accounts for more than 70 % of neonatal morbidity, mortality and healthcare expenses to the society [3].

'Prevention is better than cure' –this saying holds true for preterm labour. Since inhibiting labour once the process has started is difficult and with poor success rates, therefore over the past few decades the attention has shifted towards identifying the patients who are at risk for preterm birth and aggressive preventive programmes thereof. There are numerous pregnancy related complications which increase the risk of preterm birth, which the maternal risk scoring system fails to detect especially in asymptomatic women [4].

Since the per vaginal digital examination and cervical scoring and biochemical tests have very low sensitivity and specificity , and might initiate or augment the labour process, therefore these are almost of no use in clinical practice [5,7].

Over the last two decades the measurement of cervico-vaginal fetal fibronectin levels (Ffn) and cervical changes diagnosed by TVS have emerged as a promising prediction tool for preterm birth [8]. It is now a universally accepted fact that the shorter the cervical length, the greater is the risk of spontaneous pre-term

labour. High resolution, non invasive obstetric ultrasonography can help us measure alteration in the cervical anatomy accurately with the objectivity, safety and replicability which clinical digital examination and cervical scoring cannot provide. There are ample evidences in literature supporting the reliability of ultrasonographic evaluation of cervical shortening as measured by cervical length in assessment of the pre-term cervix [9].

There are many studies which confirm the sensitivity of USG in measurement of the cervical length and a strong association between premature shortening of cervical length and Preterm Labour in high risk population. However, these studies do not provide USG evaluation of cervical length alteration in asymptomatic group. Hence this present study was undertaken for delineating the cervical length changes in asymptomatic patients that will end up in preterm birth from cervical changes that end in term delivery, so that these cervical changes can be applied to the prevention and active management of those pregnant women suspected to be at risk for preterm labour and delivery.

MATERIALS AND METHODS:

Our study was a hospital based prospective one conducted in the dept. of Obstetrics and Gynaecology, TMMCRC (Teerthanker Mahaveer Medical College & Research Centre), Moradabad, U.P, a teaching hospital in North India, after getting proper approval from the Institutional Ethical Committee.

Case selection:

The patients were randomly selected from the Ante Natal OPD of the depth of Ob Gyn, after thorough history taking and detailed clinical examination after taking proper informed consent from each patient after being explained about the study. Those patients who fulfilled our inclusion and exclusion criteria were recruited for this study.

Inclusion criteria:

- Antenatal patients with singleton pregnancy without any high risk factors for preterm labour at period of gestation between 18 and 24 weeks.

Exclusion criteria:

- All high risk cases for preterm labour e.g.
- multiple gestation,
- Hypertensive Disorders of Pregnancy,
- Intrauterine Growth Restriction,
- diabetes,
- past history of unexplained Intrauterine Fetal Death,
- congenital uterine anomalies,
- polyhydramnios,
- Ante Partum Hemorrhage.
- Cases that were lost to follow up.

RESULTS & OBSERVATIONS:

In our study , we found that majority of the patients were young,150 patients were in the age group of 21 to 25 years (29.4 %) and only 10 patients (2.0 %) were above 35 years of age. 215 (43 %) patients were primigravidae, 347 (68.03 %) were from the urban background and 270 (52.90 %) hailed from the lower socio-economic class.

Table 1: Distribution of the patients (age wise)

Age (years)	No of cases	Percentage (%)
15 – 20	110	22.50
21 – 25	150	29.40
26 – 30	148	29.10
31 – 35	82	16.90
>35	10	2.00
Total	510	100.00

Table 2: Parity-wise distribution of patients

Parity	No of cases	Percentage (%)
P_0	215	43.00
P_1	139	27.30
P_2	122	25.00
$>P_3$	24	4.70
Total	510	100.00

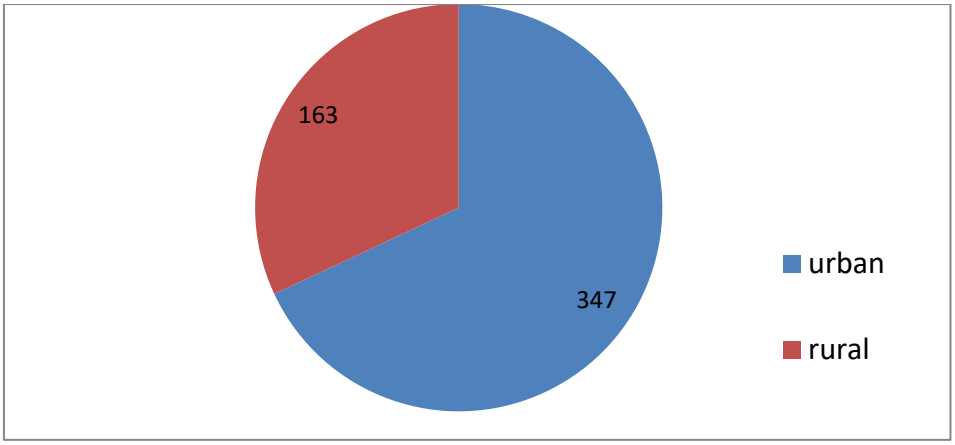

Fig- 1: Urban: Rural distribution of the patients

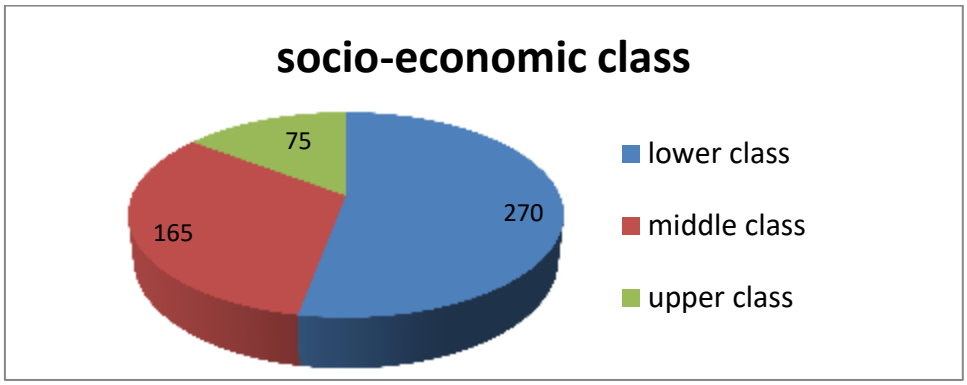

Fig-2: Socio-economic background

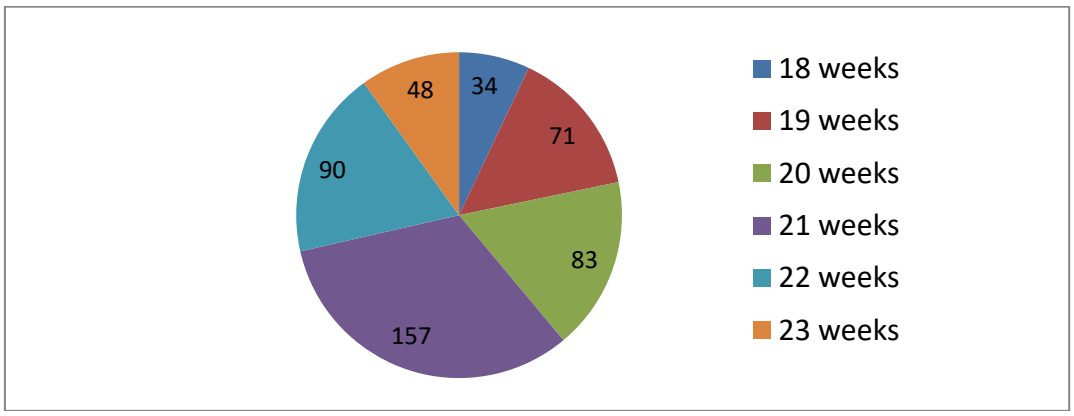

Fig-3: Distribution of cases according to gestational age (GA)

Table 3: Distribution of mean cervical length by gestational age (weeks)

Gestational age (weeks)	Mean cervical length (cm)
18	4.76
19	4.12
20	3.93
21	3.77
22	3.56
23	3.43
24	3.27

In our study we found that as the cervical length reduced, the patients went into labour at an earlier gestational age, as evidenced by our results depicted in table 4 below:

Table 4: Distribution of mean cervical length by Gestational Age (weeks) at which labour started

GA (weeks) at delivery	Total no of cases	Percentage (%)	Mean cervical length (cm)
≤28	24	4.70	2.96
29-32	48	9.41	3.95
33-36	65	12.75	3.57
≥37	373	73.13	3.98
Total	510	100.00	

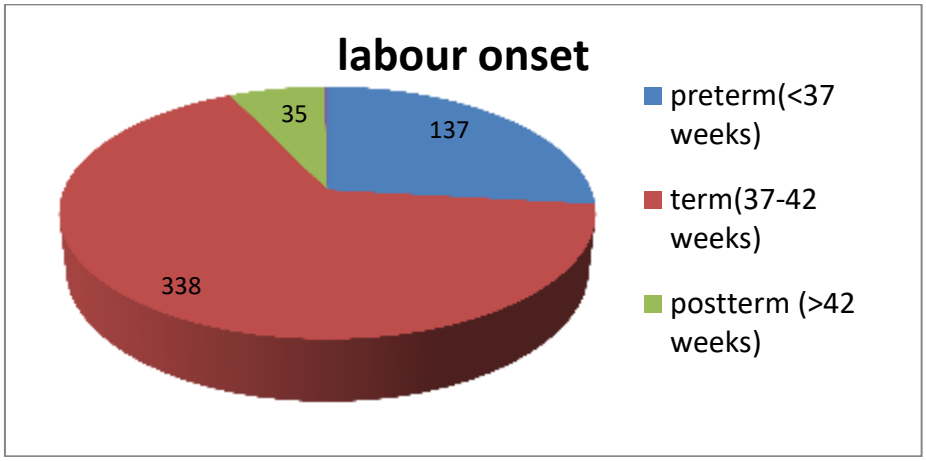

Fig- 4: Gestational Age at which labour started (preterm, term, postterm)

In our study, as depicted above, 137 patients went into preterm labour (29.90 %), 35 had postterm delivery (6.81 %) and 338 patients delivered at term (66.29 %).

Table-5: Distribution of labour according to the cervical length

Cervical length		Labour onset	
(cm)	Preterm (%)	Term/postterm (%)	Total
<1.5	5 (100.00)	0 (0.00)	5 (100.00)
1.5 – 2.0	33 (94.28)	2 (5.71)	35 (100.00)
2.1 – 2.5	51 (67.10)	25 (32.89)	76 (100.00)
2.6 – 3.0	17 (15.17)	95 (84.82)	112 (100.00)
>3.0	31 (10.99)	251 (89.00)	282 (100.00)
Total	137	273	510

χ^2 = 190.01, df = 1, P<0.0001

(Figures in brackets denote row-wise %)

The association between cervical length (row 1, 2, 3 & row 4, 5 were clubbed together), and gestational age at onset of labour was very significant (P<0.0001)

Table 6: Gestational age at labour onset versus cervical length

Cervical length	≤28 weeks		≤32 weeks		≤37 weeks		>37 weeks	
(cm)	No	%	No	%	No	%	No	%
<1.5	3	60.00	1	20.00	1	20.00	0	0.00
1.5-2.0	13	37.14	14	40.00	6	17.14	2	5.72
2.1-2.5	2	2.63	19	25.00	30	39.48	25	32.89
2.6-3.0	2	1.78	7	6.25	8	7.15	95	84.82
>3.0	4	1.41	7	2.48	20	7.09	25	89.02

Table 7: Distribution of median gestational age at which labour started by Cervical Length

Cervical length (cm)		Median gestational age at delivery (weeks)
≤1.5	5	32.50
1.6-2.0	35	33.00
2.1-2.5	76	34.10
2.6-3.0	112	36.60
>3.0	282	39.10

As is evident from the above table 7, as the cervical length increases, the median gestational age (in weeks) at labour onset and delivery also increases and vice versa which was found to be statistically significant. (r =0.98, P<0.01)

DISCUSSION:

We enrolled antenatal patients in between 18 – 24 weeks of gestation so that it could coincide with the routine anomaly scan during her Antenatal check up. The cervical length is easier to measure and results are more reliable in the second trimester than at later gestational ages. Therefore, it served both purposes in our study.

Cervical length was measured ultrasonographically and recorded along with all other obstetrical sonological parameters e.g. BPD, HC, FL, liquor volume- Pocket Depth, Amniotic Fluid Index, placenta , Estimated Fetal Weight and Composite Gestational Age. Cervical lengths measured at different gestation ages (between 18 – 24 weeks) were tabulated; the mean value of cervical length was calculated and plotted in the graph against the corresponding gestation ages. It was observed that cervical length decreases linearly with increase in gestational age i.e. nearing term. The Gestational Age at which the patient went into labour was noted and co-relation between the initially measured cervical length and GA at which labour started and all pregnancy and labour outcomes were tabulated, studied and plotted and then statistically analyzed.

We observed that the cervical length decreases linearly with increase in gestational age, as were noted by Verma and Patel et al [7]. After we plotted the gestational age at which labour started in the stratified cervical length group as < 1.5 cm, 1.6 – 2.0, 2 – 2.5, 2.6 – 3 and > 3 cm. In our study 137 (26.90%) patients delivered pre term, 35 went into post term (6.81%) and rest 338 (66.29%) delivered at term, similar to those reported by a study by Varma *et al.;* [7]. Of the 137 patients who went into pre term labour, 24 were at gestational age < 28 weeks (17.51%), 48 (35, 03%) between 28 – 32 weeks, 65 (47.46%) between 32 – 36th week .

We noted that the mean cervical length at pre term and term labour as 2.29 week and 3.98 cm respectively which is similar to those reported by Berghella *et al.;* – 20.6 and 3.13[8].

In our study 10 patients, out of which 6 had cervical length <= 1.5 cm and 4 had cervix <= 2.0 cm, were subjected to McDonald's cervical encirclage because of a history suggestive of cervical insufficiency. 6 patients out of these had funneling of the cervical canal along with dilatation of the internal os with various degrees of membrane herniations. Out of these, 2 encirclage procedures failed and 8 had successful term deliveries. Our results were comparable with those cited by a study by Anderson *et al.*[3].

CONCLUSION:

We can therefore conclude that there is little doubt about the biological reality – "shorter cervices are associated with shorter gestations." Cervical length measurement by USG can be a good tool for screening method for spontaneous preterm delivery and a cut off value for cervical length (2.5 cm) can be determined for intervention for the prevention of preterm labour. Our study demonstrates the usefulness and accuracy of Ultrasonography in cervical length measurement at 18 – 24 weeks of gestation in asymptomatic antenatal women in predicting and identifying the 'at risk' patients for preterm labour. This can go a long way in formulating strategies to prevent and manage the associated complications and improve the maternal and fetal outcomes.

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