

Study of Factors Causing and Arresting Preterm Labour

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Summary

The present study was carried out in the department of Obstetrics and Gynaecology of Mahatma Gandhi Institute of Medical Sciences, Sevagram, Maharashtra, India to study the conditions other than obvious ones like multiple pregnancy, hydramnios, hypertension, congenital malformations etc. which lead to preterm labour and also the factors which affect the arrest of preterm delivery and success or failure of tocolysis.

Hundred women with preterm labour between 28 to 37 weeks of gestation and 100 women with full term labour (controls) were included in the study. Ten percent study subjects were teenagers as compared to 5% controls. Eighteen women of study group had previous abortions as compared to 8 controls. Similarly 27 study cases had previous preterm delivery in contrast to 3% of the controls. Twelve percent of study subjects weighed 39 Kg or less in comparison to only 3% in controls. Six percent of study subjects weighed 55kg or more as compared to 35% of controls. The mean height in study subjects was 149.46 cm \pm 5.51 and in controls it was 153.25 cm \pm 4.62. Cervical swab culture was positive in 18% and urine culture in 14% women of study group as compared to 7% and 6% of controls. Labour could not be inhibited in 29% of primis as compared to 20% of mults. Fifty five percent of women had 2 cms. dilatation and in 3.6% of these women labor could not be arrested. With 3 cms dilatation of cervix, 47.5% (40) women delivered within 48 hours, with 4 cms, 100% delivered within 48 hours. With effacement of <50%, success was highly significant ($p < 0.001$). Sixty six percent study subjects had male and 34% female babies in comparison to 52% males and 48% females in controls. Urinary and cervical infections, even subclinical, anthropometry, vague symptomatology like vague pain and excessive discharge seemed to be important factors. In established preterm labour even up to 4 cms dilatation of cervix attempts must be made to arrest labour as some hours are useful for the final outcome.

Between 10 and 15% babies are believed to be born preterm. Prematurity continues to be the major cause of perinatal morbidity and mortality in developed as well as developing countries. Though a wide spectrum of causes and demographic factors have been implicated, etiology remains obscure in approximately 50% of cases. Hence attempts at prevention have not been very encouraging, so arrest continues to be the hallmark.

Early symptoms of preterm labour are so subtle that, they are frequently overlooked by women, relatives, nurses as well as physicians, so it is believed that only 10-20% of women presenting with preterm labour can be given therapy for prevention (Stubblefield, 1984). The cost of 'wait and see' attitude could mean the difference between effective or failed tocolysis resulting in preterm birth. Iams et al (1994) in a follow up investigation to his study of 1990 found that, the signs and symptoms

signaling preterm labour, appear within 24 hours of real onset of preterm labour, really late warning signs.

Present study was done with the objectives of knowing:

- The conditions other than obvious ones like multiple pregnancy, hydramnios, hypertension, congenital malformations etc. which lead to preterm labour and
- The factors which affect the arrest of preterm delivery and success or failure of tocolysis.

Material & Methods

A prospective selective study of factors causing or affecting arrest of preterm labor was carried out in the department of Obstetrics and Gynaecology of Mahatma Gandhi Institute of Medical Sciences, Sevagram, Maharashtra, India. Hundred study subjects between 28 to 37 weeks of gestation with preterm labour and 100 women with full term labour (controls) were included in the study.

Criteria for inclusion in the study were-

1. gestational age 28 weeks to 37 weeks,
2. singleton pregnancy with longitudinal lie,
3. no hydramnios or preeclampsia
4. no medical conditions obviating tocolytic therapy,
5. no sonographic evidence of congenital anomalies, placenta previa & placental abruption,
6. uterine contractions lasting for atleast 30 seconds, one or more every 10 minutes.
7. intact membranes
8. cervical dilatation of > 2cms but not greater than 4 cms.

Those women who were diagnosed to have preterm labour were admitted to obstetric wards in the observational area where continuous monitoring was possible. A detailed history was obtained, general, systemic, speculum & bimanual examinations were done under all aseptic precautions and diagnosis of preterm labour was established as per the criteria mentioned earlier. Baseline pulse, blood pressure and fetal heart rate were recorded. Women were put on bed rest in left lateral position. The findings were recorded on a pre-designed proforma. Investigations like Hb%, urine albumin and sugar, blood group, Rh typing, glucose screening, urine and cervical swab culture and sensitivity and ultrasonography were done. All women with preterm labour received intravenous drip of isoxsuprine hydrochloride (duvadilan) 40 mg in 540 ml of 5% dextrose solution. The drip was started with a rate at 10 drops per minute and increased depending on uterine and cardiovascular response. During administration of the drug, maternal pulse, blood

pressure, respiratory rate, uterine contractions, fetal heart rate and side effects like nausea, vomiting, palpitations, breathlessness were recorded. Maternal hypotension was defined as a drop of B.P. by 15 mm Hg or more from baseline diastolic blood pressure, maternal tachycardia, as pulse rate of 120 per min. or more and fetal tachycardia as fetal heart rate of 160 per min. or more, persisting for atleast 10 min (Brazzy et al, 1981). The drug rate, at which contractions ceased, was continued further for 12 hours. Before discontinuing the intravenous therapy oral isoxsuprine was given (10 mg tablet) and was later continued every 8 hours till 37 weeks or delivery, whichever was earlier. On recurrence of uterine contractions, therapy was reinstated intravenously. Betamethasone 12mg was given at zero hour, repeated after 12 hrs of first dose and after 7 days. Antibiotics were given to only culture positive women.

Observations

Fifty eight percent study cases and 64% controls were between 20-24 years. Ten percent study subjects were teenagers as compared to 5% controls, however this was statistically not significant ($p > 0.05$). Mean age of the study subjects was 23.33 ± 4.12 and of the controls 23.4 ± 3.4 (statistically no significant difference, $p > 0.05$). Similarly there was no significant difference when age 30 or more was considered. Eighty eight percent of study subjects belonged to lower middle or upper lower socioeconomic status and 79% of controls also belonged to the same classes. (statistically no significant difference, $p > 0.05$).

Eighteen women of study group had previous abortions as compared to 8 controls. Similarly, 27 study cases had previous preterm delivery in contrast to 3% of controls (statistically highly significant difference, $p < 0.001$). Twelve percent of study subjects had weight 39 kg or less in comparison to only 3% in controls (statistically significant difference, $p < 0.05$). Six percent of study subjects had weight 55kg or above as compared to 35% of controls (statistically highly significant difference, $p < 0.001$). The mean weight of study subjects was $44.57 \text{ kg} \pm 5.82$ and that of controls $48.19 \text{ kg} \pm 7.3$ (highly significant difference, $p < 0.001$). Fifty seven percent of study women had height 150 cms or less in comparison to 35% in controls (statistically significant difference, $p < 0.05$). The mean height in study subjects was 149.46 ± 5.51 and controls $153.25 \text{ cm} \pm 4.2$ (statistically significant difference, $p < 0.001$). Ten percent of women with preterm labor had hemoglobin 6 gms in comparison to 5% in controls, however, statistically this was insignificant difference ($p > 0.05$). The mean hemoglobin in study cases was 8.65 ± 1.64 and in controls 9.94 ± 1.51 a statistically insignificant difference.

($p < 0.05$). Fourteen percent of study subjects had colonization in urine as against only 6% of controls and 28% of study subjects had cervical colonization as compared to 7% controls, highly significant difference, ($p < 0.001$).

Of 25 study subjects at gestation 28-30 wks, 12% delivered within 24 hrs, 4% between 24 & 48 hrs., 24% between 48 hrs to 7 days and 52% after more than 7 days but before term and 8% delivered at term. At 31-33 weeks of gestation, 25% delivered within 24 hours and in 6.8% pregnancy could be prolonged till term, at 34-36 wks. 22.5% delivered within 24 hrs. and 16% delivered at term. Sixty six percent study subjects had male and 34% female babies in comparison to 52% males and 48% females in controls (statistically significant difference, $p < 0.05$). Labour could not be inhibited in 29% primi gravidae as compared to 20% multigravidae. In women weighing less than 40 kg labor could not be prolonged in 35.2%. With 55 kg or more weight, 33% of women delivered within 48 hours out in the weight group of 40-54.9kg 22% delivered within 48 hours. Out of 57 women, of less than 150 cms height 60.38% delivered within 48 hours in comparison to 20.9% women with height more than 150 cms. (Statistically insignificant difference, $P > 0.05$). Success and failure rates in hemoglobin of $< 8 \text{ gm}\%$ and

$> 8 \text{ gm}\%$ were found to be statistically significant ($p < 0.5$). Sixty percent women with preterm labour had body mass index (BMI) less than 19.8 in comparison to only 16% in controls (highly significant difference, $P < 0.001$). Out of 60 women with $\text{BMI} < 19.8$, labor could be arrested only in 16.6% where as out of 40 women with $\text{BMI} > 19.8$ 37.5% delivered within 48 hrs. Fifty five percent of women had 2 cms. dilation and in 3.6% of these labor could not be arrested. With 3 cms dilatation of cervix, 47.5% (40) women delivered within 48 hours. When cervical dilatation was 4 cm, 100% delivered within 48 hours. When effacement of 50% was considered and success was taken into account it was found to be highly significant ($p < 0.001$) (Table I and II).

Discussion

The 5-10% incidence of preterm births has remained almost constant inspite of advances in obstetric / neonatal risk scoring systems, tools to predict preterm labor and use of variety of tocolytic agents. Prematurity accounts for 70-75% of perinatal mortality and demands large resources, technical and nontechnical. One of the most significant challenges for clinicians treating the pregnant women, continues to be diagnosis and treatment of preterm labor and prevention of preterm

Table I
Correlation between Demographic Factors, Past Performance and Arrest of preterm labour.

Factors	No.	Labor inhibited >48 hrs. (Success)	%	Labor within 48 hrs. (Failure)	%
Age					
< 20	10	10.00	100	-	
20-29	82	57	69.50	25	30.48
>30	08	08	100.00	-	
Parity					
Primi	47	33	70.20	14	29.78
Multi	53	42	79.24	11	20.75
Weight					
< 40	17	11	64.70	06	35.20
40-54.9	77	60	77.90	17	22.00
>55	06	04	66.60	02	33.30
Height					
<150	57	41	71.90	16	28.00
>150	43	34	79.06	09	20.90
BMI					
< 19.8	60	50	83.30	10	16.60
>19.8	40	25	62.50	15	37.50
History of Previous Abortion	18	15	83.30	03	16.60
History of Previous Preterm	27	19	70.30	08	29.60

Table II
Correlation between various clinical and investigative factors and arrest of preterm labour

Factors	No.	Labor inhibited >48 hrs. (Success)	%	Labor within 48 hrs. (Failure)	%
Cervical Direction					
Anterior	04	04	100.00	-	
Midposed	68	51	75.00	17	25.00
Posterior	28	20	71.42	08	28.50
Cervical Dilatation					
2cm	55	53	96.36	02	03.63
3 cm	40	21	52.50	19	47.50
4 cm	05	02	40.00	03	60.00
Cervical Effacement					
25%	54	53	98.14	01	01.80
50%	17	15	88.23	02	11.76
75%	21	08	38.09	13	61.90
100%	08	-	08.00	100	-
Station of Head in Pelvis					
-3	21	20	95.20	01	04.70
-2	31	31	100.00	00	
-1	29	20	68.96	09	31.03
0	17	04	23.50	13	73.40
+1	02	00	-	02	100.00
HB%					
<8 gm%	38	32	84.21	06	15.70
8-10 gm%	46	32	69.56	14	30.40
>10 gm%	16	11	68.75	05	31.25
Colonization in urine	14	06	42.85	08	57.10
Cervical Colonization	28	21	75.00	07	25.00
Colonization in both urine and cervix	03	00	-	03	100.00

births.

Main (1987), Satin et al (1994) and Kristensen et al (1995) in a population based study in Denmark demonstrated a weak, but statistically significant association between idiopathic preterm births with maternal age under 20 years. Hagan et al (1996) did a study to ascertain the demographic and obstetric factors associated with very preterm infants and found that more of study mothers were at extremes of age (<20 yrs and >34 yrs). Meis et al (1995) in univariable analysis of demographic risk factors found parity to be in U shaped relationship with preterm births, with both high and low parity showing increased rates. Main (1988) also reported that prepregnancy weight and weight gain in pregnancy are two major determinants for gestational

age and weight at birth. Earlier Keirse et al (1978) had reported that history of one previous preterm birth is associated with a recurrence risk of 17-40%, risk increasing with the number of preterm births and decreasing with term deliveries. We did not find any significant difference in age pattern however weight, height and past obstetric performance were significant factors. Tyagi and Agarwal (1989) studied maternal anthropometry as determinant of gestation at birth and observed that women with height less than 155 cms had high incidence of prematurity. However, low maternal height after adjustment for other demographic factors especially weight, was not significantly associated with preterm births in Meis et al's study (1995). We found maternal anthropometry to be important for predicting possibilities of preterm delivery. Lieberman and Ryan

(1988) reported that women with hematocrit of 37% and less have twice the risk of having a premature birth as compared to women with hematocrit between 41% to 44%. However Harding et al (1997) in their study of prediction of pregnancy outcome in relation to hemoglobin before 20 weeks reported that high and low values of hemoglobin are not predictive of preterm labour. Lieberman and Ryan (1988) whose multivariate analysis of a large birth set in Boston found maternal anaemia to be a major risk. Armer and Duff (1991) reviewed all English language papers published between 1980 and 1990 describing results when amniocentesis was performed at the time of admission in women with preterm labour and found that 13% women had chorioamnionitis demonstrated by positive amniotic fluid cultures. Pathogenic bacteria have typically been recovered at transabdominal amniocentesis from approximately 20% of women in preterm labour without evidence of overt clinical infection and with intact fetal membranes (Cox et al 1996). In our study subjects 14% and 28% had positive urine and cervical culture respectively, 10% of women were symptomatic and gave history of increased vaginal discharge. In controls 2% and 7% had colonization in urine and cervix respectively.

Newman and Campbell (1990) have shown that an increase in the number of uterine contractions precedes the onset of preterm labour and that women are often not aware of this until labour is advanced. Hill and Fleming (1990), and Wapner et al (1995) showed improvement in percentage of subjects whose preterm labour was diagnosed before 2 cms dilatation. The best tocolysis should prolong pregnancy so that delivery would be expected at term. However, the results of meta-analyses indicate that β -sympathomimetics can be expected to prolong pregnancy by 24-48 hrs from the start of treatment and therefore have a limited effect on the total gestation (Lamont 1993). Kierse et al (1978) found the risk of delivery to be reduced from 27.9% to 10.6% and within 48 hrs from 37% to 24%. However these hours may be crucial for the outcome if they are used for transfer to a suitable tertiary unit and the administration of steroids.

The pragmatic approach to prevention of preterm labour requires a thorough knowledge and understanding of epidemiology and etiopathogenesis. Unfortunately, presently prevention of preterm birth is similar to a puzzle for which all pieces are not available. However some success in procuring, more and more of the pieces of puzzle have been achieved to enable attempts of comprehensive care of such at risk women. Only when we have placed together all the components of the comprehensive programme, we will be able to offer

preterm birth prevention. At present, past obstetric performance and urinary / cervical infection, even subclinical seem to be important and anthropometry might give some warning. It is important to remember vague symptomatology, vague pain and excessive discharge. In established preterm labour up to 3 cms dilatation of cervix attempts must be made to arrest labour as even some hours are useful for the final outcome. Despite research on the methods for prediction of preterm labour, no gold standard with high specificity, sensitivity and positive predictive value has been found. Therefore, substantial progress towards its prevention remains an elusive goal.

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