

Original Article

Predictive value of various risk factors for preterm labor

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Abstract

Objective(s): To evaluate the predictive value of risk factors for spontaneous preterm labor. **Method(s):** This prospective study was conducted on 390 pregnant women, of which 290 in preterm labor were taken as the study group and 100 in term labor were taken as controls. Risk factors were studied and various risk factors were identified. Statistical analysis was done by logistic regression analysis using SPSS software. **Result(s):** Presence of factors like chorioamnionitis, bacterial vaginosis, urinary tract infection, heavy work, prior preterm labor, medical disorders and placental abnormalities were significantly associated with preterm labor. **Conclusion(s):** Risk factors like previous preterm birth and placental abnormalities can not be modified hence preventive efforts should be directed towards modifying working conditions during current pregnancy, good antenatal care, and appropriate management of infections and medical disorders.

Introduction

Fetus is nurtured in the uterus protected from the outside world. For reasons unknown when this gestation is shortened, preterm labor tries to expel the fetus. Preterm delivery makes adaptation to the extrauterine life difficult for these neonates. Immaturity of their body systems poses problems as these premature babies are prone to respiratory distress syndrome, hyperbilirubinemia, inadequate thermal regulation, necrotizing enterocolitis etc. increasing their mortality and morbidity.

Preterm labor refers to the onset of uterine contractions of sufficient strength and frequency to effect progressive dilatation and effacement of the cervix between 20 and 37 weeks of gestation.

It has been widely recognized that prevention and/or effective management of preterm labor will improve neonatal outcome and will have a profound impact on social and long term public health care costs.

Methods

The present study was conducted on 390 pregnant women admitted in labor from January 2005 to June 2006. The study group consisted of 290 women admitted with the diagnosis of preterm labor and 100 pregnant women admitted with labor pains at term, (i.e. after 37 weeks) selected on a systemic sampling basis to form the control group.

Criteria for inclusion in the study group-

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1. Gestational age between 28 to 37 weeks
2. Regular uterine contractions occurring at a frequency of at least 1 every 10 minutes synchronizing with pain
3. Cervical dilatation greater than 1cm
4. Intact membranes

Criteria for exclusion in the study group-

Patients of preterm labor with ruptured membranes

To study the association between predisposing factors and likely etiological factors for preterm labor detailed history of the patients was required.

General, systemic, abdominal, speculum and vaginal examinations, routine investigations, urine culture and sensitivity, high vaginal swab culture and sensitivity, and ultrasonography were done. Statistical tools like logistic regression analysis, sensitivity, specificity, positive predictive value, negative predictive value were used to evaluate and identify various risk factors.

Results

Table 1 shows the various risk factors identified in the study. 41.72% of the patients belonged to low socioeconomic status and, 40% patients were involved in heavy work demanding long standing hours. History of prior preterm births and prior abortions was found in 14.14% each.

Table 2 shows infections to be the most important causative factor for preterm birth in 65.51% cases.

Table 3 analyzes the relationship between risk factors and spontaneous preterm labor arrived at by applying logistic regression analysis employing SPSS software.

Chorioamnionitis (OR 4.69%; 95% CI, 1.6 – 13.6), bacterial vaginosis (OR 5.05; 95% CI, 1.16 – 21.8), heavy work (OR 2.38; 95% CI, 1.61 – 3.38), prior preterm birth (OR 9.46; 95% CI, 1.20 – 74.70), medical disorders (OR 5.1; 95% CI, 1.21 – 22.18) and placental abnormalities (OR 10.32; 95% CI, 2.31 – 46.04), were found to be significant.

Table -1: Predisposing factors as identified in the study group (n=290)

Predisposing factor	Number	Percentage
Low socioeconomic status	121	41.72
Heavy work	116	40.00
Weight (prepregnancy) <45 kg.	40	13.79
Family history	12	4.14
Short stature (height <145 cm)	53	18.28
Smoking	12	4.14
Previous abortions	41	14.14
Previous preterm births	41	14.14
Previous pregnancy loss	25	8.62
Lack of antenatal checkup	226	77.93

Table 2: Comparative evaluation of the causes of preterm labor (n=290)

Causes	Number	Percentage
Infections	190	65.51
Uterine		
• Chorioamnionitis	87	30
Extrauterine		
• Bacterial vaginosis	94	32.41
• Urinary tract infections	59	20.34
• Other septic foci (causing fever and systemic upsets)	14	4.82
Maternal medical disease	57	19.65
Uterine over distension	23	0.79
Multifetal pregnancy	17	5.86
Polyhydramnios	6	2.06
• Multiple pregnancy	3	1.03
• Neural tube defect	1	0.34
• Omphalocele	1	0.34
• Rh isoimmunization	1	0.34
Uterine anatomic abnormalities	14	4.82
Placental abnormality	78	26.89
Fetal abnormality	8	2.76

Predictive values for these significant factors are shown in Table 4. History of prior preterm birth and presence of placental abnormality had highest positive predictive value i.e. 95%.

Discussion

It is observed that 77.93% women were unbooked, and the highest prevalence of preterm labor was in the low socioeconomic groups. Similar results have been reported by Meis and colleagues¹.

Involvement in heavy work requiring prolonged standing accounted for 40% of the preterm labor. This is similar to the findings of Henriksen et al² and Luke et al³.

65.51% of our cases had some or the other infection. Uterine infections, as diagnosed by histopathological examination of placenta and membranes after delivery, were associated with 30% of the cases.

Bacterial vaginosis accounted for 32.41% of the cases comparable to 40% reported by Glantz⁴. Urinary tract infection was found to be associated with 20.34% of the cases. Bacterial vaginosis has also been reported as one of the important factors by Hillier et al⁵, Meis et al⁶.

Logistic regression analysis was done to calculate the odds ratios, 95% confidence intervals and P values for various risk factors with the help of SPSS software. The P values for chorioamnionitis, bacterial vaginosis, uri-

Table 3: Logistic regression analysis of various risk factors for preterm labor (n = 290)

Risk factor	Odds ratio	95% confidence interval	P value	Inference
Chorioamnionitis	4.69	1.6 – 13.6	0.0045	Highly significant
Bacterial vaginosis	7.62	2.2 – 25.3	0.0009	Highly significant
Urinary tract infection	5.05	1.16 – 21.8	0.0301	Significant
Heavy work	2.38	1.61 – 3.38	0.0157	Significant
History of abortions	2.80	0.81 – 9.70	0.1037	Not significant
Previous pregnancy loss	2.25	0.74 – 6.8	0.1529	Not significant
Previous preterm births	9.46	1.20 – 74.70	0.331	Significant
Family history of preterm birth	2.35	0.29 – 19.01	0.4237	Not significant
Short stature (height <145 cm)	3.07	0.87 – 10.83	0.0813	Not significant
Weight <45 kg	1.25	0.40 – 3.91	0.7053	Not significant
Inadequate antenatal checkups	1.59	0.67 – 3.78	0.2929	Not significant
Medical disorders	5.1	1.21 – 22.18	0.0264	Significant
Multiple pregnancy	10.81	0.45 – 260.14	0.1423	Not significant
Polyhydramnios	0.07	0.0025-1.9749	0.1188	Not significant
Placental abnormality	10.32	2.31 – 46.04	0.0022	Significant

nary tract infection, heavy work, prior preterm birth, maternal medical disorders and placental abnormalities were found statistically significant. The results in accordance with the study of Goldenberg et al⁷. In our study the odds ratio for previous preterm labor was 9.46 with 95% confidence interval of 1.20 – 74.70. This means that if history of previous preterm labor is present there is at least 1.2 times increased risk of having preterm labor in this pregnancy. Similarly the minimum increased risk for heavy work and urinary tract infection are 1.61 and 1.16 respectively. Our findings are comparable to those of Moutquin⁸.

Our finding of minimum increased risk of 2.2 for bacterial vaginosis is comparable to that found by

Leitich et al⁹.

The predictive values for significant risk factors were studied. For infections, sensitivity was 65.5%, specificity 22%, positive predictive value 89% and negative predictive value 43%.

Heavy work as a risk factor has a sensitivity of 40%, specificity of 12%, positive predictive value of 90%, and negative predictive value of 24%. For previous preterm birth sensitivity was 14.13%, specificity 2%, positive predictive value 95%, and negative predictive value 28%. Sensitivity for medical disorders was 19.60%, specificity 4%, positive predictive value 93% and negative predictive value 29%. For placental ab-

Table 4: Predictive values for significant risk factors (n = 290)

Risk factors	Sensitivity (Percent)	Specificity (Percent)	Positive predictive value (Percent)	Negative predictive value (Percent)
Infections (Chorioamnionitis, Bacterial vaginosis, Urinary tract infection)	65.5	22	89	43
Heavy work	40	12	90	24
Prior preterm birth	14.13	2	95	28
Maternal medical disorders	19.60	4	93	29
Placental anomaly	26.89	4	95	39

normalities, sensitivity was 26.89%, specificity 4% positive predictive value 95% and negative predictive value 39%.

Table 4 shows that the positive predictive values for various significant risk factors range between 89 – 95% and negative predictive values range between 24 – 43%. These results are comparable to the findings of ¹⁰ who reported positive predictive values of between 94 to 98% and negative predictive values of between 41 to 76% for risk factors.

Most of the risk factors having adverse past history, and placental fetal and uterine anomalies are amenable to treatment which could reduce the possibilities of preterm birth, and neonatal morbidity and mortality.

Conclusion

Some risk factors like previous preterm birth and placental abnormalities cannot be modified but preventive efforts should be directed towards modifying working conditions during current pregnancy, good antenatal care and appropriate management of infections and medical disorders.

References

1. Meis PJ, Michielutte R, Peters TJ et al. Factors associated with preterm birth in Cardiff, Wales. II. Indicated and spontaneous preterm birth. *Am J Obstet Gynecol* 1995;173:597-602.
2. Henriksen TB, Hedegaard M, Secher NJ et al. Standing at work and preterm delivery. *Br J Obstet Gynecol* 1995;102:198-206.
3. Luke B, Mamelie N, Keith L et al: The association between occupational factors and preterm birth. *Am J Obstet Gynecol* 1995;173:849-62.
4. Glantz JC. Screening and treatment of bacterial vaginosis during pregnancy: a model for determining benefit. *Am J Perinatol* 1997;14:487-90.
5. Hillier SL, Nugent RP, Eschenbach DA et al. Association between bacterial vaginosis and preterm delivery of a low birth weight infant. The Vaginal Infections and Prematurity Study Group. *N Engl J Med* 1995;333:1737-42.
6. Meis PJ, Goldenberg RL, Mercer B et al. The preterm prediction study: significance of vaginal infections. *Am J Obstet Gynecol* 1995;173:1231-5.
7. Goldenberg RL, Iams JD, Mercer BM et al. The preterm prediction study: The value of new vs standard risk factors in predicting early and all spontaneous preterm birth. *Am J Public Health* 1998;88:233-8.
8. Moutquin JM. Socio economic and psychosocial factors in the management and prevention of preterm labor. *BJOG* 2003;110:56-60.
9. Leitich H, Bodner-Adler B, Brunbauer M et al. Bacterial vaginosis as a risk factor for preterm delivery: a meta analysis. *Am J Obstet Gynecol* 2003;189 139–147.
10. Beverly A, Van Der Pool : Preterm labour : diagnosis and treatment Problem - Oriented Diagnosis. *American Family Physician*. 1998; 57: 1-10.