



PREDICTIVE VALUE OF VARIOUS RISK FACTORS FOR PRETERM LABOR

Purvi K Patel¹, Dipa S Pitre², Suman P Bhooker³

Financial Support: None declared

Conflict of interest: None declared

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How to cite this article:

Patel PK, Pitre DS, Bhooker SP. Predictive Value of Various Risk Factors for Preterm Labor. Natl J Community Med. 2015; 6(1):121-5.

Author's Affiliation:

¹Associate Professor; ²Assistant Professor; ³Senior resident, Dept. of Obstetrics & Gynecology, Medical College, Baroda

Correspondence:

Dr. Purvi K Patel
E-mail: drpurvipatel@gmail.com

Date of Submission: 27-11-14

Date of Acceptance: 15-02-15

Date of Publication: 31-03-15

ABSTRACT

Objective: The objectives of this study were to study the various etiological factors responsible for onset of preterm labor and to evaluate the predictive value of these risk factors for spontaneous preterm labor.

Methods: This prospective comparative study was conducted over a period of 1 year and included 240 women; of which 120 in preterm labor were enrolled in the study group and 120 with term pregnancy in labor were enrolled in the control group. History, clinical examination and investigations were carried out and risk factors for preterm labor were noted and analyzed to find out the predictive value of the risk factors for preterm labor.

Results: Maximum numbers of patients (31.6%) were in the 35-36 weeks gestational age group. When both the groups were compared as regards risk factors, the cases showed a high incidence of infections; 21.7% incidence of chorioamnionitis, 32.5% incidence of bacterial vaginosis and a 12.5% incidence of urinary tract infections. Prior second trimester abortion was found in 13.3% cases and a history of prior preterm birth was found in 15% cases. Uterine over distension was observed in 20.83% cases. Maternal medical disorders were present in 60% cases.

Conclusions: Multiple pregnancy, Prior preterm birth, Infections, Prior second trimester abortions and medical disorders in mother are strongly associated with an increased risk of preterm labor.

Key words: Preterm, labor, predictive value, pregnancy

INTRODUCTION

Preterm labor is defined as the onset of labor in women before 37 completed weeks of gestation. The incidence of preterm labor varies from 10-15% of all pregnancies.¹ Currently, preterm labor is one of the most challenging problems confronting the obstetricians and the perinatologists, as prematurity accounts for 50-75% of the perinatal mortality.²

There are various causes of preterm labor, though in a majority of cases, the cause is unknown. Infections, maternal medical and surgical disorders, uterine over-distension, uterine anomalies, placental anomalies and fetal pathologies are amongst the causes for preterm labor. There are some factors associated with preterm labor like socio-economic, genetic, constitutional and obstetric.

During the past two decades, we have come closer to understanding the etiology of sponta-

neous preterm birth, but we still need better markers to identify women at risk for preterm delivery. The present study was undertaken to identify the various factors responsible for preterm labor. With this background, the objectives of this study were to study the various etiological factors responsible for onset of preterm labor and to evaluate the predictive value of these risk factors for spontaneous preterm labor.

METHODS

The study group consisted of women admitted with the diagnosis of preterm labor and the control group consisted of pregnant women admitted with labor pains at term in the department of Obstetrics and Gynecology, SSG Hospital, Baroda. This prospective comparative study was conducted on 240 women; of which 120 in preterm labor were enrolled in the study group and 120 with term pregnancy in labor were enrolled in the control group. The study duration was 1 year (from 1 August 2011 to 31 July 2012)

Inclusion criteria for the study group:

1. Gestational age between 28 to 37 weeks
2. Regular uterine contractions occurring at a frequency of at least 4 in 20 minutes or 8 in 60 minutes synchronizing with pain
3. Cervical dilatation greater than 1cm with effacement of cervix
4. Intact membranes

Exclusion criteria in the study group:

1. Patients of preterm labor with ruptured membranes
2. Patients not willing to give consent for the study
3. Intra-uterine fetal death
4. Eclampsia
5. Severe obstetric bleeding; either abruptio placenta or placenta previa

Patient information sheet was given to all women enrolled in the study and an informed written consent for participation in the study was taken. Detailed history of the patients was taken. The data were collected as regards the age, parity, educational status, social and environmental history, obstetric history maternal medical conditions and any treatment. General, systemic, abdominal, speculum and vaginal examinations, routine investigations, CRP, urine culture and sensitivity, high vaginal swab culture and sensitivity, and ultrasonography were carried out.

Details of neonate at birth were recorded. Maternal and neonatal follow-up was done up to discharge from the birth.

Prevalence rate of different risk factors were calculated and compared. The data was analyzed calculating odd's ratio and P value with help of medical statistical software for windows. P value of <0.05 was considered statistically significant. Statistical tools like sensitivity, specificity, positive predictive value, and negative predictive value were used to evaluate and identify various risk factors.

RESULTS

The study included 120 cases and 120 controls that were enrolled during the study period of 1 year. Both the groups were comparable with regards to age, parity and residential status. As seen in the table 1, maximum numbers of patients (38 i.e.31.6%) were in the 35-36 gestational age group.

Many patients had more than one predisposing factor so the sum doesn't come up to 100%. As seen from the above table, heavy work, smoking, tobacco chewing, pre-pregnancy height and weight were not found have a statistically significant association with occurrence of spontaneous preterm labor. Low socio-economic status, prior second trimester abortion and inadequate antenatal care had a significant association with preterm births. Prior preterm deliveries, uterine over-distension and maternal medical disorders were found to have a highly significant association with preterm labor.

Bacterial vaginosis accounted for 32.5% and urinary tract infections for 12.5% of cases. 21.7% cases were CRP positive as compared to only 4.2% controls suggesting a role of infection and inflammation in preterm labor. Other infections associated with systemic manifestations in form of fever were seen in 6.7% cases as compared to 0.8% controls.

Table 1: Gestational age wise distribution of cases

Gestational age in weeks	Number of cases (%)
28-30	19 (15.8)
31-32	27 (22.6)
33-34	36 (30)
35-36	38 (31.6)
Total	120 (100)

Table 2: Various predisposing factors under study and their significance

Predisposing factors	Cases n=120 (%)	Controls n=120 (%)	OR with 95% CI	P value
Low socio-economic status	54 (45)	34 (28.3)	2.02 (1.18-3.45)	0.01*
Heavy work	24 (20)	15 (12.5)	1.75 (0.86-3.53)	0.11
Pre-pregnancy weight < 45 kg	28 (23.3)	25 (20.8)	1.15 (0.62-2.13)	0.64
Height < 145 cm	22 (18.3)	16 (13.3)	1.45 (0.72-2.94)	0.29
Smoking	6 (5)	2 (1.7)	3.10 (0.61-15.70)	0.17
Tobacco chewing	12 (10)	6 (5)	2.11 (0.76-5.82)	0.14
Prior second trimester abortion	16 (13.3)	5 (4.2)	3.53 (1.25-9.99)	0.01*
Prior preterm births	18 (15)	4 (3.3)	5.11 (1.67-15.61)	0.004*
Inadequate antenatal care	64 (53.3)	45 (37.5)	1.90 (1.13-3.18)	0.014*
Maternal medical disorders (anemia, Pregnancy induced hypertension, jaundice, cardiac disease, epilepsy, diabetes mellitus, tuberculosis etc)	72 (60)	19 (15.8)	7.97 (4.32-14.69)	<0.0001*
Uterine over distension (polyhydramnios, multiple pregnancy)	25 (20.83)	1 (0.8)	31.31 (4.16-235.34)	0.0008*

*significant (p < 0.05)

Odd's ratio and P value calculated by Medcalc software

Table 3: Infections as a cause of preterm labor

Infections	Cases n=120 (%)	Controls n=120 (%)	OR with 95% CI	P value
CRP reactive (chorioamnionitis)	26 (21.7)	5 (4.2)	6.36 (2.35-17.20)	0.0003*
Bacterial vaginosis	39 (32.5)	10 (8.3)	5.29 (2.49-11.23)	<0.0001*
Urinary tract infection	15 (12.5)	5 (4.2)	3.28 (1.15-9.35)	0.025*
Other infections (associated with fever)	8 (6.7)	1 (0.8)	8.5 (1.04-69.05)	0.04*

*significant (p < 0.05)

Odd's ratio and P value calculated by Medcalc software

Table 4: Predictive value of significant risk factors

Risk factor	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
Chorioamnionitis	21.7	95.8	83.9	55.0
Bacterial vaginosis	32.5	91.7	79.6	57.6
Urinary tract infection	12.5	95.8	75.0	52.3
Prior 2 nd trimester abortion	13.3	95.8	76.2	52.5
Prior preterm birth	15.0	96.7	81.8	53.2
Maternal medical disorders	60.0	84.2	79.1	67.8
Multiple pregnancy	17.5	99.2	95.5	54.6

PPV=Positive predictive value & NPV=Negative predictive value

Chorio-amnionitis and bacterial vaginosis were found to be highly significant statistically as causes of preterm delivery. Urinary tract infections and other systemic infections were also found to have significant association with occurrence of preterm births.

The above table shows the predictive value of various risk factors. Chorioamnionitis, bacterial vaginosis, urinary tract infection, prior second trimester abortions, prior preterm birth and multiple pregnancy are the strongest predictors of preterm births.

DISCUSSION

When the spontaneous preterm births were sub-classified based on gestational age, this study observed that severe prematurity (28-30 weeks) was noted in 15.8% cases. 31-34 weeks gestational age was noted in 52.6% cases and 35-36 weeks gestational age (late preterm or near term) was observed in 31.6% cases. This distribution is found worldwide and the late preterm neonates are also associated with significant morbidities in the neonatal period. In this study, however, we did not include extreme prematurity.

The hospital where this study was conducted largely caters to the low socio-economic group of women. In this study, low socio-economic status was found to be a significant risk factor in preterm births. Studies evaluating the role of socio-economic status in preterm deliveries have found similar association.^{3,4} In this study, heavy work was not found to have a statistically significant association with preterm births. The data on effect of work on causation of preterm births is contradictory. A recent study found that night work may be related to early but not late preterm birth, whereas physically demanding work did not strongly predict risk.⁵

Maternal anthropometric parameters had no significance on preterm deliveries in this study. Similar findings were observed by Honest et al.⁶ In this study, we did not find an association of preterm births with smoking and tobacco chewing. However, studies do find that smoking is moderately associated with preterm birth. The more the mother smokes, the greater the risk.⁴ One of the strongest clinical risk factors for preterm birth is a prior preterm birth.^{7,8} Same was found in this study. Inadequate antenatal care was found to be a significant risk factor for preterm birth. Blondel et al⁹ has found similar results. Maternal medical disorders were a strong predictor of preterm birth in this study. Similar results have been noted in a study.¹⁰ Multiple gestations have an increased risk for preterm births, and result in 12-27% of all preterm deliveries.¹¹ In this study too we noted a highly significant association of multiple pregnancies and preterm deliveries.

Infections are often the most common risk factors of preterm births. Genital tract infections account for about 25-40% of preterm deliveries. Women with Chlamydia trachomatis, Gardnerella vaginalis, Trichomonas vaginalis, Neisseria gonorrhoeae, Treponema pallidum, have a higher rate of preterm births. Still, infection is difficult to detect due to the limitations of conventional microbial techniques and the difficulties in obtaining appropriate diagnostic samples during pregnancy.¹² Spontaneous preterm deliveries that occur before the 34th week of gestation, have been strongly associated to intrauterine infection. Intrauterine inflammation most commonly presents as chorioamnionitis, which is defined as inflammation (caused usually by bacterial infection) of the chorion, amnion, and placenta. Intrauterine inflammation is one of the most common antecedents of premature birth.¹¹ Chorioamnionitis causes an inflammatory cas-

cade that results in preterm labor. Chorioamnionitis (clinical and histologic combined), complicates as many as 40-70% of preterm births with premature membrane rupture or spontaneous labor.¹³ In this study too, 21.7% cases were CRP positive as compared to only 4.2% controls suggesting a role of infection and inflammation in preterm labor. Lamont concluded that infection is responsible in 40% cases for preterm labor and suggested that the earlier the abnormal genital tract colonization occurs, the greater is the risk of adverse outcome.¹⁴

Bacterial vaginosis accounted for 32.5% and urinary tract infections for 12.5% of cases in this study. The results are comparable to studies by Glantz et al¹⁵, Hiller et al¹⁶ and Meis et al.¹⁷ In a large recent meta-analysis of more than 20,000 women, Leitich et al¹⁸ reported that bacterial vaginosis more than doubled the risk of preterm birth.

Table 4 shows the predictive value of various risk factors. Beverly¹⁹ observed similar results in his study. Accurate prediction of preterm births among asymptomatic pregnant women and those with threatened preterm labor might offer an opportunity to target more intensive antenatal surveillance and prophylactic measures to those most likely to benefit from preventive modalities.²⁰

CONCLUSIONS

Multiple pregnancy, prior preterm birth, Infections, prior second trimester abortions and medical disorders in mother are strongly associated with an increased risk of preterm labor. Modifiable risk factors can be identified and modified as primary prevention strategies. Risk factors like previous preterm birth, multiple pregnancies and placental abnormalities cannot 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.

REFERENCES

1. Kore S J, Rao S, Bhagwat A, Gujarati P et al. Prediction of preterm labor by transvaginal sonography. Bombay hospital journal 2004.
2. Dasgupta S. Preterm labor. In; Immunological basis of pathophysiology. Mukherjee OG, Buckshee K editors, 1st edition, 1998;4-7.

3. KS Joseph, John Fahey, Ketan Shankerdass et al. Effects of socio-economic position and clinical risk factors on spontaneous and iatrogenic preterm birth. *BMC Pregnancy and Childbirth* 2014, 14:117
4. Berkowitz G, Papiernik E. Epidemiology of preterm birth. *Epidemiol Rev* 1993;15:414 - 443.
5. Lawson CC, Whelan EA, Hibert EN, Grajewski B, Spiegelman D, Rich-Edwards JW Occupational factors and risk of preterm birth in nurses. *Am J Obstet Gynecol*. 2009;200(1):51.e1.
6. Honest H, Bachmann LM, Ngai C, Gupta JK, Kleijnen J, Khan KS The accuracy of maternal anthropometry measurements as predictor for spontaneous preterm birth--a systematic review. *Eur J Obstet Gynecol Reprod Biol*. 2005;119(1):11.
7. Spong CY. Prediction and prevention of recurrent spontaneous preterm birth. *Obstet Gynecol* 2007;110:405-15.
8. Boyd HA, Poulsen G, Wohlfahrt J, Murray JC, Feenstra B, Melbye M Maternal contributions to preterm delivery. *Am J Epidemiol*. 2009;170(11):1358.
9. Blondel B, Dutilh P, Delour M, Uzan S. Poor antenatal care and pregnancy outcome. *Eur J Obstet Gynecol Reprod Biol* 1993;50:191 - 196.
10. CV Ananth, AM Vintzileos. Maternal-fetal conditions necessitating a medical intervention resulting in preterm birth. *Am J Obstet Gynecol*. 2006;195(6):1557-1563.
11. Goldenberg RL, Culhane JF, Iams JD, Romero R. Epidemiology and causes of preterm birth. *The Lancet* 2008; 371:75-84.
12. Jasovic-Siveska E (2014) Prevention and Prediction of Preterm Birth-Status Quo in the Last 50 Years. *Reprod Syst Sex Disord* 3:e117. doi: 10.4172/2161-038X.1000e117
13. Yoon BH, Romero R, Moon JB, et al. Clinical significance of intra-amniotic inflammation in patients with preterm labor and intact membranes. *Am J Obstet Gynecol*. 2001;185:1130.
14. Lamont RF. Infection in prediction and antibiotics in prevention of spontaneous preterm labor and preterm birth. *BJOG*;2003: 110(2):71-5.
15. Glantz JC. Screening and treatment of bacterial vaginosis during pregnancy; a model for determining benefit. *Am J Perinatol* 1997;14:487-90.
16. Hillier SL, Nugent RP, Eschanbach 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.
17. Meis PJ, Goldenberg RL, Mercer B et al. The preterm prediction study: significance of vaginal infections. *Am J Obstet Gynecol* 1995; 173: 1231-5.
18. Leitch H, Bodner-Adler B, Brunbauer M, Kaidler A, Egarter C, Husslein P. Bacterial vaginosis as a risk factor for preterm delivery: a meta-analysis. *Am J Obstet Gynecol* 2003;189:139 - 147.
19. Beverly A, Von Der Pool. Preterm labor: diagnosis and treatment-problem oriented diagnosis. *American Family Physician* 1998; 57 (may 15):10.
20. Chang HH, Larson J, Blencowe H, Spong CY, Howson CP, et al. Preventing preterm births: analysis of trends and potential reductions with interventions in 39 countries with very high human development index. *Lancet* 2013;381: 223-234.