

Chapter 5

PRETERM BIRTH: HOW CAN WE PREDICT AND PREVENT?

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Spontaneous preterm birth (sPTB) is defined as having a delivery under 37th gestational week and continues to be an important obstetric problem worldwide. Preterm delivery is known as the biggest direct reason of death in children under 60 months of age and is associated with severe morbidity in remaining alive newborns⁽¹⁾. Preterm birth rate is approximately 11.1 % worldwide and 15 million babies are born prematurely⁽²⁾. Today, the predictability of preterm delivery continues to challenge obstetricians. As a result, complications related to preterm labor continue to be the most major reason of neonatal morbidity and mortality, and prematurity continues to be the most common and most expensive obstetric complication among newborns hospitalization⁽³⁻⁵⁾. The aim of the present book chapter is to provide the reader with up-to-date evidence on the predictability and preventability of preterm labor.

WHAT ARE THE RISK FACTORS OF SPONTANEOUS PRETERM BIRTH?

1- History of spontaneous preterm delivery

The most major and main clinical risk factor for sPTB is to have PTB in previous pregnancy⁽¹⁾, which increases the risk of PTB 1.5 to 2 times in the current pregnancy, and more considerably, the count of previous preterm delivery and the gestational age at the previous birth seriously affect the risk of preterm delivery⁽⁵⁾. Many authors have shown that the frequency of recurrent sPTB is 15 % to 31 % in pregnant women having history of one preterm birth, and more increased in pregnant women having history of two PTB^(6,7).

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seventy two trials involving nearly 90,000 subjects were evaluated⁽³²⁾. However, almost none of them, neither alone nor combination, was found clinically useful to predict sPTB. Fetal fibronectin in cervico-vaginal fluid seems the most useful biomarker for predicting of sPTB. There are lots of studies evaluating fetal fibronectin. According to those studies results, fetal fibronectin may be useful marker to predict sPTB between seven and fourteen days in pregnant women having uterine contractions and cervical effacement and dilatation; however, it is not useful more than fourteen days after testing⁽³³⁻³⁶⁾.

REFERENCES

1. Management of preterm labor. Practice Bulletin No. 171. American College of Obstetrics and Gynecology. *Obstet Gynecol* 2016;128:e155-164.
2. Blencowe H, Cousens S, Ostergaard MZ, et al. National, regional and worldwide estimates of preterm birth. *Lancet* 2012;379:2162 – 2172
3. Blencowe H, Lee AC, Cousens S, et al. Preterm birth associated neurodevelopmental impairment estimates at regional and global levels for 2010. *Pediatr Res* 2013;74(Suppl 1): 17 – 34
4. Mwaniki MK, Atieno M, Lawn JE, et al. Long-term neurodevelopmental outcomes after intrauterine and neonatal insults: a systematic review. *Lancet* 2012;379: 445 – 452
5. McManemy J, Cooke E, Amon E, et al. Recurrence risk for preterm delivery. *Am J Obstet Gynecol* 2007;196:576. e1–6
6. Laughon SK, Albert PS, Leisher K, et al. The NICHD Consecutive Pregnancies Study: recurrent preterm delivery by subtype. *Am J Obstet Gynecol* 2014; 210:131.e1
7. Yamashita M, Hayashi S, Endo M, et al. Incidence and risk factors for recurrent spontaneous preterm birth: A retrospective cohort study in Japan. *J Obstet Gynaecol Res* 2015;41:1708-1714
8. Dodd JM, Jones L, Flenady V, et al. Prenatal administration of progesterone for preventing preterm birth in women considered to be at risk of preterm birth. *Cochrane Database Syst Rev* 2013; :CD004947.
9. Meis PJ, Klebanoff M, Thom E, et al. Prevention of recurrent preterm delivery by 17 alpha-hydroxyprogesterone caproate. *N Engl J Med* 2003; 348:2379-2385
10. Hassan SS, Romero R, Vidyadhari D, et al. Vaginal progesterone reduces the rate of preterm birth in women with a sonographic short cervix: a multicenter, randomized, double-blind, placebo-controlled trial. *PREGNANT Trial. Ultrasound Obstet Gynecol* 2011;38:18–31.
11. Crane JM, Hutchens D. Transvaginal sonographic measurement of cervical length to predict preterm birth in asymptomatic women at increased risk: a systematic review. *Ultrasound Obstet Gynecol* 2008;31:579–587.
12. ACOG Practice Bulletin No. 130: Prediction and Prevention of Preterm Birth *Obstet Gynecol.* 2012 Oct;120(4):e964-173.
13. Whitworth M, Quenby S. Prophylactic oral betamimetics for preventing preterm labour in singleton pregnancies. *Cochrane Database Syst Rev* 2008; :CD006395
14. Khanprakob T, Laopaiboon M, Lumbiganon P, et al. Cyclo-oxygenase (COX) inhibitors for preventing preterm labour. *Cochrane Database Syst Rev* 2012; 10:CD007748
15. Fuchs F, Monet B, Ducruet T, et al. Effect of maternal age on the risk of preterm birth:

- A large cohort study. *PLoS One* 2018; 13:e0191002
16. Shapiro-Mendoza CK, Barfield WD, Henderson Z, et al. CDC Grand Rounds: Public Health Strategies to Prevent Preterm Birth. *MMWR Morb Mortal Wkly Rep* 2016; 65:826-830
 17. Lykke JA, Dideriksen KL, Lidegaard O, et al. First-trimester vaginal bleeding and complications later in pregnancy. *Obstet Gynecol* 2010; 115:935-944
 18. Lockwood CJ. Risk factors for preterm birth and new approaches to its early diagnosis. *JPerinat Med* 2015; 43:499-501.
 19. Klein LL, Gibbs RS. Use of microbial cultures and antibiotics in the prevention of infection-associated preterm birth. *Am J Obstet Gynecol* 2004; 190:1493-1502.
 20. Williams MC, O'Brien WF, Nelson RN, et al. Histologic chorioamnionitis is associated with fetal growth restriction in term and preterm infants. *Am J Obstet Gynecol* 2000; 183:1094-1099
 21. Prevention of Group B Streptococcal Early-Onset Disease in Newborns: ACOG Committee Opinion, Number 797. *Obstet Gynecol* 2020; 135:e51
 22. Andrews JI, Diekema DJ, Hunter SK, et al. Group B streptococci causing neonatal bloodstream infection: antimicrobial susceptibility and serotyping results from SENTRY centers in the Western Hemisphere. *Am J Obstet Gynecol* 2000; 183:859-862.
 23. Wong LF, Wilkes J, Korgenski K, et al. Risk factors associated with preterm birth after a prior term delivery. *BJOG* 2016; 123:1772-1778.
 24. Rodrigues T, Barros H. Short interpregnancy interval and risk of spontaneous preterm delivery. *Eur J Obstet Gynecol Reprod Biol* 2008; 136:184-188
 25. Rodriguez MI, Chang R, Thiel de Bocanegra H. The impact of postpartum contraception on reducing preterm birth: findings from California. *Am J Obstet Gynecol* 2015; 213:703.e1.
 26. Di Mascio D, Magro-Malosso ER, Saccone G, et al. Exercise during pregnancy in normalweight women and risk of preterm birth: a systematic review and meta-analysis of randomized controlled trials. *Am J Obstet Gynecol* 2016; 215:561-571.
 27. Aune D, Schlesinger S, Henriksen T, et al. Physical activity and the risk of preterm birth: a systematic review and meta-analysis of epidemiological studies. *BJOG* 2017; 124:1816-1826.
 28. Kyrklund-Blomberg NB, Cnattingius S. Preterm birth and maternal smoking: risks related to gestational age and onset of delivery. *Am J Obstet Gynecol* 1998; 179:1051.
 29. Villar J, Gülmezoglu AM, de Onis M. Nutritional and antimicrobial interventions to prevent preterm birth: an overview of randomized controlled trials. *Obstet Gynecol Surv* 1998; 53:575.
 30. Kumarasamy V, Mitchell MD, Bloomfield FH, et al. Effects of periconceptual undernutrition on the initiation of parturition in sheep. *Am J Physiol Regul Integr Comp Physiol* 2005; 288:R67.
 31. Meertens LJE, van Montfort P, Scheepers HCJ, et al. Prediction models for the risk of spontaneous preterm birth based on maternal characteristics: a systematic review and independent external validation. *Acta Obstet Gynecol Scand* 2018;97:907-920.
 32. Conde-Agudelo A, Papageorgiou AT, Kennedy SH, et al. Novel biomarkers for the prediction of the spontaneous preterm birth phenotype: a systematic review and metaanalysis. *BJOG* 2011; 118:1042.
 33. Hezelgrave NL, Abbott DS, Radford SK, et al. Quantitative Fetal Fibronectin at 18 Weeks of Gestation to Predict Preterm Birth in Asymptomatic High-Risk Women.

Obstet Gynecol 2016; 127:255-260

34. Kuhrt K, Smout E, Hezelgrave N, et al. Development and validation of a tool incorporating cervical length and quantitative fetal fibronectin to predict spontaneous preterm birth in asymptomatic high-risk women. *Ultrasound Obstet Gynecol* 2016; 47:104-109.
35. Esplin MS, Elovitz MA, Iams JD, et al. Predictive Accuracy of Serial Transvaginal Cervical Lengths and Quantitative Vaginal Fetal Fibronectin Levels for Spontaneous Preterm Birth Among Nulliparous Women. *JAMA* 2017; 317:1047-1056
36. Saade GR, Boggess KA, Sullivan SA, et al. Development and validation of a spontaneous preterm delivery predictor in asymptomatic women. *Am J Obstet Gynecol* 2016; 214:633.e1