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Research Article

The Association of Maternal Periodontal Disease with Preterm Delivery: A Prospective Study

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Abstract

Introduction: The association of maternal periodontitis with Preterm Birth (PB) and low birth weight (LBW), which has been suggested by a number of retrospective studies, was examined by a prospective follow-up study.

Methods: A total of 215 pregnant women from Hartford Hospital, Connecticutwere offered a dental screening during a routine prenatal care visit. Patients were given a score of 1-4 indicating their overall oral health status. A score of 1 indicated no oral care needed (assigned to group A). A score of 2 and 3 signified the need for routine prophylaxis with radiographic imaging and the need for comprehensive care, respectively (assigned to group B). A score of 4 indicated a need for urgent treatment (assigned to group C). All patients were treated as indicated and prospectively followed to delivery over a 12-month rolling recruitment.

Results: Of the 215 women, 25 (12%) had a preterm birth, including 15 (9%) from group B (n=165), and 10 (22%) from group C (n=45). There were significant associations between severity of periodontal disease and probabilities of PB (<37 weeks, <34 weeks, and <32 weeks). Adjusted odds ratios (95% CI) for the above PB parameters are 2.46 (1.01 – 6.01), 3.69 (1.01 – 13.47), 16.07 (1.76 – 147.04), respectively. However, no association was found between severity of periodontal disease and LBW at term (<2500g) or small for gestational age.

Conclusions: Our data suggests that maternal periodontal disease may significantly increase the risk of preterm birth, even though routine dental prophylaxis and / or treatment have been given during pregnancy.

Keywords: Preterm delivery; Dental care; Periodontitis; High risk pregnancy

Introduction

Despite many advances in maternal and fetal care during pregnancy, preterm birth remains a significant cause of neonatal morbidity and mortality. It is estimated that 15 million babies per year are born before 37 weeks gestation with 1 million deaths each year secondary to preterm birth complications [1]. While some causes of preterm birth can be prevented with routine prenatal care, many causes are still undiscovered or uncertain.

In 1996, maternal periodontal disease was first proposed as one of the risk factors for preterm birth and low birth weight [2]. Since then, a number of studies have investigated the potential relationship between periodontitis and preterm birth and low birth weight [3-5]. However, the majority of studies were retrospective and the results have been controversial. Hence, nearly 20 years later, prospective studies with a greater degree of standardization are still needed in order to confirm this association.

The presence of gingival inflammation is commonly used for periodontal disease diagnosis. While some measurements used in periodontal disease diagnosis can be affected by the pregnant state, many studies have shown that pregnancy does not cause gingivitis and its presence in pregnancy would therefore be indicative of poor oral health at the onset of pregnancy [6]. Probing depth is also a commonly used measurement for periodontal disease and often used as an indicator for disease advancement [7]. Although there is no standard definition for periodontal disease, we believe the measurement of gingival inflammation and probing depth more accurately identify pregnant patients with periodontal disease.

The objective of this study is to observe whether there is an association between poor oral health and adverse pregnancy outcome by prospectively following pregnant women over a 12 month rolling recruitment.

Methods

This study was conducted in the high-risk Obstetrics clinic of Women's Ambulatory Health Services (WAHS) at Hartford Hospital. A total of 215 high risk pregnant patients were offered a dental screening during a routine prenatal care visit. All patients included in the study will have at least one risk factor to be considered a high-risk pregnancy. Although standard of care is for an annual dental prophylaxis, many of these patients do not routinely have, or have not had, a dental exam. A database will be established to track maternal data and follow neonatal outcomes to determine the effect of appropriate dental care during pregnancy in this high-risk population. Because poor oral health has been linked to preterm labor and intra-uterine growth restriction (IUGR), risk factors for these conditions will be followed in patients agreeing to concurrent dental care.

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At their prenatal visit, a dental hygienist screened the participating patients after the routine prenatal exam. Dental examination criteria included evidence of plaque (light/moderate/heavy); level of gingival inflammation (mild/moderate/severe); localized versus diffuse inflammation; periodontal health readings of probing depth (≤3mm/ 4-5mm/ 6-8mm/ >9mm); calculus evidence (light/moderate/heavy); and amount of tooth staining (light/moderate/heavy). The primary reason for examination findings was also noted, including poor oral hygiene, food/beverage, or tobacco habit (Form 1).

Based on the dental exam findings, patients were given a score of 1-4 indicating their overall oral health status. A score of 1 indicated no current oral health needs and up-to-date oral screening. A score of 2 signified the need for routine prophylaxis and radiographic imaging. A score of 3 indicated a need for comprehensive care. A score of 4 indicated a need for urgent treatment due to pain. Patients with a score of 1 were assigned to study group A. Patients with a score of 2 or 3 were assigned to study group B. Patients with a score of 4 were assigned to study group C.

Patients included in the study also received a thorough obstetrical and gynecological interview to identify potential confounding factors of preterm delivery. Obstetrical risk factors for PTD including history of PTD, history of Preterm Premature Rupture Of Membranes (PPROM), IUGR, history of drug abuse, and history of alcohol or tobacco use were recorded (Form 2).

Patients requiring treatment for periodontal disease were offered treatment options along with dental education. Those patients needingor desiring routine prophylaxis and scaling were given treatment, and those requiring further treatment were either given a follow-up appointment or referred to their own dentist. Follow-up appointments were scheduled as needed to evaluate need for re-treatment and to follow up on each patient's dental hygiene. Patients requiring dental radiography were told to follow up with their dentist postpartum. Patient oral health was followed throughout their prenatal care, but baseline screening served as the ultimate basis for risk-level stratification.

Study patients were then followed to delivery, and the birth outcomes of the three study groups such as APGAR scores at 1 and 5 minutes were recorded. Deliveries were recorded as full-term (≥37 weeks gestation) or pre-term (<37 weeks gestation). Any complication of preterm labor and treatment received was also noted. Neonatal birth weights were recorded as normal (≥2500g) or low (<2500g). The gender of the babies is not available for this study, hence the gender specific criteria for female infants were used, which is less than the tenth percentile for each specific gestational age. Chi-square tests were used to determine differences in proportions of the outcomes between the three maternal dental risk groups. Logistic regressions were used to estimate odds ratio of preterm delivery outcomes (<37 wks, <34 wks, <32 wks) based on oral hygiene (A vs. B&C) along with other risk factors, while adjusting for confounding factors (i.e. history of PTD, age, smoking, PPROM, ETOH, and drug use).

Results

Our data suggests that there is a significant association between the severity of periodontal disease and the probabilities of moderately preterm birth (<37 weeks), very preterm birth (<34 weeks), and extremely preterm birth (<32 weeks). Adjusted odds ratios and 95% CI's are 2.46 (1.01 – 6.01), 3.69 (1.01 – 13.47), 16.07 (1.76 – 147.04), respectively (Figure 1). There was no significant association between the severity of periodontal disease and the probability of low birth weight at term (<2500g). There also was no significant association between the severity of periodontal disease and the probability of SGA (small for gestational age). Maternal age was negatively associated with an odds of SGA (Adjusted OR = 0.842, 95% CL=0.748 – 0.948). There was no significant association between the severity of periodontal disease and APGAR scores at either 1 minute or 5 minutes.

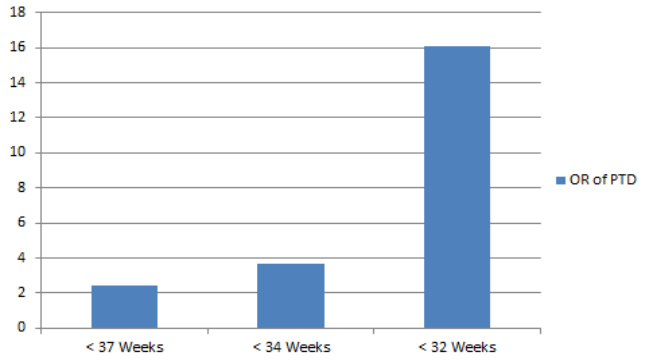

Figure 1: The figure shows the adjusted odds ratios for Pre-Term Delivery (PTD) in those with poor dental hygiene, groups B or C compared to group A.

No significant association was found between PTD, LBW, or SGA and other potential confounding factors such as a history of PTD, PPROM, smoking, ETOH use, or illegal drug use. Additional analyses conducted among dental risk groups B and C showed that a later gestational age at which the first dental exam was performed is associated with a lower odds of preterm birth (Adjusted OR=0.898, 95% CL=0.837 – 0.962) and very preterm birth (Adjusted OR=0.846, 95% CL=0.750-0.955).

Discussion

The problem of preterm delivery is augmented by the lack of effective therapies in treating the known causes of preterm delivery. Periodontal disease is a potentially preventable and treatable cause of preterm delivery. The high prevalence of periodontal disease in populations at increased risk of preterm delivery offers an opportunity to provide effective and inexpensive methods of reducing preterm delivery associated with periodontal disease.

While the variation in the results of prior studies has been due largely to study design, a significant cause of the discrepancies revolves around the definition of periodontal disease itself. There is currently no universally agreed upon definition of periodontal disease, making it very difficult to achieve standardization [8]. In one study, periodontal disease was defined as the presence of four or more teeth showing at least one site with four millimeters of probing pocket depth in addition to clinical attachment loss at the same site with bleeding on probing [9]. Another study used only attachment loss to determine the presence of periodontal disease, citing it as a reliable and quantitative measure directly associated with the anatomical definitions of periodontal disease [10]. Until a widely accepted

and uniform definition of periodontal disease can be agreed upon, it will be difficult to compare study results. Variations in results, therefore, may simply be the result of differences in definitions and methodology.

The strengths of the study include its prospective design and the twelve month rolling recruitment. Unlike currently available trials, this study adjusts for preexisting medical and social conditions that are confounding factors for the target outcome of preterm delivery. By identifying a history of smoking, drug use, alcohol use, Premature Preterm Rupture Of Membranes (PPROM), and a prior history of PTD, this study was able to establish a significant association between periodontal disease and PTD. We believe this to be a main strength of this study. Our results confirm the significant association between severity of periodontal disease and probabilities of preterm delivery. It further establishes no significant association between the severity of periodontal disease and the probabilities of low birth weight at term (< 2500 g).

Limitations in our study include a lack of details related to the Preterm Delivery (PTD) events. Causality cannot be discussed without information regarding the circumstances of preterm delivery. Furthermore, although younger age appears to be associated with an increased odds ratio of SGA, established medical etiologies for SGA such as chronic hypertension, gestational hypertension, and diabetes were not available for analysis in determining the extent to which age functions as an independent factor. The association between extremely preterm birth (<32 weeks) and periodontal disease should be interpreted with caution due to a wide confidence interval.

To better understand the relationship of periodontal disease and preterm delivery, future studies should track identifiable causes of the preterm delivery, such as iatrogenic indications or placental trauma/disease. At present, there is inadequate data to establish a causal relationship between periodontal disease and poor pregnancy outcome in the form of preterm delivery. Further prospective studies are needed to investigate both low-risk and high-risk populations. However, this does not preclude an effort by clinicians to identify and treat periodontal disease as a component of good dental hygiene. Further studies investigating whether treatment of periodontal disease can reduce the risk of preterm delivery can benefit clinicians in determining the extent to which medical resources can be reasonably used towards that end.

Conclusion

One of the most important findings of our study is a significant association of periodontal disease and increased risk of preterm delivery. Women with periodontal disease may represent a potential patient population that could benefit significantly from effective intervention. These data, therefore, lend support for further investigation into periodontal disease as a reversible risk for preterm delivery.

References

1. World Health Organization. Preterm birth factsheet.
2. Offenbacher S, Katz V, Fertik G, Collins J, Boyd D, Maynor G, et al. Periodontal infection as a possible risk factor for preterm low birth weight. J Periodontol. 1996; 67: 1103-1113.
3. Boggess KA, Edelstein BL. Oral health in women during preconception and pregnancy: implications for birth outcomes and infant oral health. Matern Child Health J. 2006; 10: S169-174.
4. Breedlove G. Prioritizing oral health in pregnancy. Kans Nurse. 2004; 79: 4-6.
5. Agueda A, Echeverría A, Manau C. Association between periodontitis in pregnancy and preterm or low birth weight: Review of the literature. Med Oral Patol Oral Cir Bucal. 2008; 13: E609-615.
6. Laine MA. Effect of pregnancy on periodontal and dental health. Acta Odontol Scand. 2002; 60: 257-264.
7. Kim J, Amar S. Periodontal disease and systemic conditions: a bidirectional relationship. Odontology. 2006; 94: 10-21.
8. Boggess KA. Society for Maternal-Fetal Medicine Publications Committee. Maternal oral health in pregnancy. Obstet Gynecol. 2008; 111: 976-986.
9. Vogt M, Sallum AW, Cecatti JG, Morais SS. Factors associated with the prevalence of periodontal disease in low-risk pregnant women. Reproductive Health. 2012; 9: 3.
10. Jeffcoat M, Parry S, Sammel M, Clothier B, Catlin A, Macones G. Periodontal infection and preterm birth: successful periodontal therapy reduces the risk of preterm birth. BJOG. 2011; 118: 250-256.

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