Article

ORAL HEALTH CARE HABITS AND ITS ROLE IN PREVENTING ADVERSE PREGNANCY OUTCOMES IN RWANDA

C. Bayingana[1,*], J. Kayintenkore[2], C. Mambo Muvunyi[1], Y. Kayonga[3], A. Musemakweli[4]

[1] National University of Rwanda, Department of Clinical biology, Teaching hospital of Butare-Rwanda.
[2] National University of Rwanda, Department of Stomatology, Teaching hospital of Butare-Rwanda.
[3] Catholics University of Rwanda, Department of Social work.
[4] National University of Rwanda, Department of Internal Medicine, Teaching hospital of Butare-Rwanda.

ABSTRACT

Background: More than 20 million infants in the world (15.5 % o all births) are born preterm with low birth weight (PLBW). Ninety-five % of them are in developing countries and the rate of PLBW in developing countries is more than double (16.5 %) that in developed countries. It has been suggested that oral infection can act as the site of origin for dissemination of periodontopathogens and their toxins as well as induce inflammatory mechanisms to distant body sites, thus linking periodontal diseases to pre-term delivery of low birth weight (PLBW) infants. The objective of this study was to assess the general oral health care habit of pregnant mothers in order to determine its association with premature delivering of low birth weight infants.
Methods: Study participants were asked to complete a questionnaire to obtain information regarding their oral health care habits and the responses linked to their gestation term and time of delivery. In addition, their mouths were examined for gingival inflammation and / or bleeding which might be attributed to lack of oral health care.
Results and conclusion: Although in this study oral health care habits of the mothers did not appear to directly influence the gestation period and birth weight of the infants, the resulting gingival inflammation and bleeding showed a significant correlation with PLBW ($p = 0.004$). Therefore maternal dental care during pregnancy and good oral hygiene habits could be highly recommended. Also more detailed examination and assessment of the oral health status of mothers with particular emphasis on periodontal disease and its association with adverse pregnancy outcomes are needed.

Keywords: Oral health care habits - adverse pregnancy outcomes - Prevention Rwanda.

RESUME

Introduction: Plus de 20 millions d'enfants (15.5 %) au monde naissent prématurément. Quatre-vingt quinze % parmi eux se retrouvent dans les pays en voie de développemt où la fréquence des naissances d'enfants prématurés et à sous-poids est plus du double (16.5 %) que celle des pays développés. Il a été suggeré qu'une infection d'origine orale peut être à la source de la dissemination des bactéries paradontal et leurs produits toxiques à des sites éloignés du corps humain ainsi faisant une liaison entre les maladies paradontales et les accouchements prematurés et à sous-poids. L'objectif de ce travail était de faire une évaluation général de l'état de santé buccal des femmes enceintes en vue de determiner s'il y aurait une association avec les accouchements prématurés et à sous poids.
Méthodes: Un questionnaire était donné aux participants de cette étude pour obtenir des informations en rapport avec leur état de santé buccale et aussi les informations en rapport avec le temps de gestation. Aussi un examen de la cavité buccal était fait pour avoir une idée sur l'état d'inflammation et de saignaiment de la gencive.
Résultats et conclusion: Quoique que dans cette étude, l'hygiène buccale des participants n'avait pas une influence directe sur la période de gestation et aussi sur le poid des enfants, il y avait une corrélation significative ($p = 0.004$) entre l'inflammation et le saignement de la gencive avec les accouchements prématurés et à sous poids.

Mots-clés: Hygiène dentaire - Association - Accouchements - Prématurés

INTRODUCTION

Although women take more care of their teeth than men, three-quarter of periodontal office visits are made by women [1]. Female hormones during puberty, menses, pregnancy, contraceptive use and menopause have been suggested to play an important role in periodontal disease infection [2-6]. Periodontal disease is an infection of the tissues surrounding and supporting the teeth [7]. The increase of estrogen and progesterone concentration in plasma stimulate bacterial growth and are associated with periodontal disease progression [8, 9, 10].
It has been suggested that oral infection can act as the site of origin for dissemination of periodontopathogens and their toxins as well as induce inflammatory mechanisms to distant body sites, thus linking periodontal diseases to pre-term delivery of low birth weight (PLBW) infants [11-23] and the risk of infection is considered to be exacerbated by the increase of estrogen and progesterone concentration during puberty, menses, pregnancy, contraceptive use and menopause [2-10].

More than 20 million infants in the world (15.5 % of all births) are born preterm with low birth weight (PLBW). ninety-five % of them are in developing countries [24] and the rate of PLBW in developing countries is more than double (16.5 %) that in developed countries (7 %) with 15 % occurring in Subsaharan Africa [24, 25]. Preterm birth is defined as birth before 37 weeks of gestation [26, 27] while Low birth weight refers to infants who weigh less than 2500 gram.
It is known that PLBW infants are exposed to serious health

*Correspondence to:
Claude Bayingana
Department of Clinical Biology
Faculty of Medicine
National University of Rwanda
Huye-Rwanda
Telephone: +250782896940
E-mail: cbayrw2000@yahoo.fr

problems, including, neurodevelopmental disturbances, ear infections, respiratory infections, asthma and death [28]. Ten % of neonatal mortality world-wide is caused by prematurity [29]. In the US, 25 % of neonatal mortality is due to prematurity [30]. The objective of this study was to assess the general oral health care habit of pregnant mothers by means of questionnaire in order to determine their risk for premature delivering of low birth weight infants.

MATERIALS AND METHODS

This study requested the consent and participation of 200 randomly selected women admitted to the department of obstetrics and gynecology of the teaching hospital of Butare in Rwanda. The stage of gestation was determined by recording the last date of menstruation of the patient or by ultrasound. Study participants were asked to complete a questionnaire to obtain information regarding their oral health care habits and the responses linked to their gestation term and time of delivery.

In addition, their mouths were examined for gingival inflammation and / or bleeding which might be attributed to lack of oral health care. However, none of the clinical measurements usually employed for diagnosing periodontal disease were done and thus the outcome of this study is based purely on the responses to the questionnaire and the overall appearance of the mothers' mouth on examination.

Data were analyzed using SPSS 14.0. All questionnaires and oral examination data were entered into ExCel 2003 and then were transferred in Statistical Package for Social Sciences (SPSS) for analysis. Frequencies, means, standard deviation were calculated using descriptive statistics. The significance of associations was determined using chi-squared and Fisher's exact test. A p value of < 0.05 was considered significant.

RESULTS

Not all of the participants responded to all of the questions asked, so the results which follow are based on the number of responses to each question, and not the total number of participants in the study.

When asked about the frequency of visits to the dentist, 135 of the 200 participants reported that they never visit a dentist while less than half reported visiting the dentist once or twice a year (Table 1). There was no significant difference between normal birth and PLBW in either of these groups. The majority reported having no access to medical and dental care (Table 1), and although this factor did not appear to directly influence the gestation period and birth weight of the infants, the resulting gingival inflammation and bleeding showed a significant correlation with PLBW ($p = 0.004$).

Of the 155 participants who reported on the frequency of tooth brushing, 92 claimed they brushed once a day, 58 reported twice a day and 5 reported that they brushed after every meal. Frequency of brushing did not appear to indicate normal birth or PLBW outcome. Forty reported pain and 99 reported bleeding while brushing their teeth, while 113 and 63 reported no pain nor bleeding when brushing their teeth. No significant differences could be established in either of these categories for adverse pregnancy outcomes (Table 1).

DISCUSSION

The objective of this study was to assess the relationship between maternal oral hygiene habit and the risk for PLBW.

No significant correlation was found between the frequency of dental and PLBW ($p = 0.063$), but the results show that patients who never visited a dentist were more likely to deliver PLBW infants (80.4 %) than normal birth (62.9 %). Previous studies found that women who received dental care or treatment before or during their pregnancy had 50 % lower risk of delivering PLBW [31], but this was not the case in this sample group.

A significant correlation ($p = 0.004$) was observed between maternal gingival inflammation and PLBW. Earlier studies found a good relationship between gingival inflammation and PLBW [16, 23, 32-35]. However, this was not the case when comparing mothers with PLBW infants and the control group in a study by Jarjoura et al [36].

Although in this study no significant correlations were found between maternal oral hygiene habits and PLBW a significant relationship was found between maternal gingival inflammation and PLBW. Therefore maternal dental care during pregnancy and good oral hygiene habits could be highly recommended.

Clinical research has in the past largely excluded women. Diseases that affect them disproportionately were less likely to be studied [37, 38] and it is only during the last decade that research has focused on issues relating to women's health. In the US for example, it was only in 1990 when the office of research on women's health within the office of the Director at the National Institutes of Health (NIH), reviewed inequities in biomedical research, treatment and diagnosis of diseases affecting women [38]. More research is needed particularly in pregnant women of trying to eliminate the risk factors for adverse pregnancy outcomes.

Preterm delivery is a significant cost factor in healthcare with a considerable cost of long-term care for children with resulting disabilities. This was clearly demonstrated in a

study in USA which showed a neonatal cost of $ 224, 400 for a newborn at 500-700 g while only $1,000 for a new born at over 3,000 g [39].

The authors would like to emphasis that this was not an assessment of periodontal disease per se but that it is viewed that this study has paved the way for more detailed examination and assessment of the oral health status of mothers with particular emphasis on periodontal disease and its association with adverse pregnancy outcomes.

CARACTERISTICS	FREQUENCY (%)	Normal birth N (%)	PLBW N (%)	p value
VISIT FREQUENCY TO A DENTIST:				0.063
Never	135 (67.5)	61 (62.9)	74 (80.4)	
Once a year	42 (21.0)	28 (28.9)	14 (15.2)	
Twice a year	8 (4.0)	5 (5.2)	3 (3.3)	
Whenever	4 (2.0)	3 (3.1)	1 (1.1)	
Total	189 (94.5)	97 (100.0)	92 (100.0)	
No response	11 (5.5)			
General total	200 (100.0)			
ACCESS TO MEDICAL OR DENTAL CARE				0.223
Yes	33 (16.5)	19 (19.6)	14 (14.4)	
No	161 (80.5)	78 (80.4)	83 (85.6)	
Total	194 (97.0)	97 (100.0)	97 (100.0)	
No response	6 (3.0)			
General total	200 (100.0)			
GINGIVAL INFLAMMATION AND BLEEDING				0.004
Yes	104 (52.0)	45 (45.5)	59 (65.6)	
No	85 (42.5)	54 (54.5)	31 (34.4)	
Total	189 (94.5)	99 (100.0)	90 (100.0)	
No response	11 (5.5)			
General total	200 (100.0)			
FREQUENCY OF TOOTH BRUSHING				0.352
Once a day	92 (46.0)	44 (58.7)	48 (60.0)	
Twice a day	58 (29.0)	27 (36.0)	31 (38.8)	
After every meal	5 (2.5)	4 (5.3)	1 (1.2)	
Total	155 (77.5)	75 (100.0)	80 (100.0)	
No response	45 (22.5)			
General total	200 (100.0)			
BLEEDING WHILE BRUSHING				0.522
Yes	99 (49.5)	48 (61.5)	51 (60.7)	
No	63 (31.5)	30 (38.5)	33 (39.3)	
Total	162 (81.0)	78 (100.0)	84 (100.0)	
No response	38 (19.0)			
General total	200 (100.0)			
PAIN WHILE BRUSHING				0.104
Yes	40 (20.0)	23 (31.5)	17 (21.2)	
NO	113 (56.5)	50 (68.5)	63 (78.8)	
Total	153 (76.5)	73 (100.0)	80 (100.0)	
No response	47 (23.5)			
General total	200 (100.0)			

ACKNOWLEDGEMENT

The authors would like to thank late Dr. Claude SIBOMANA and all the staff of the department of obstetric-gynecology of the Teaching hospital of Butare in Rwanda for their co-operation and assistance in patient selection, and pregnant women for their willing co-operation in the study. Also, we would like to thank Mr. Theogene BAHIZI for his assistance for the management of all the questionnaires.

REFERENCES

1. University of Maryland Medical Center.2008. Periodontal disease-Risk Factors. [online]. Available http://www.umm.edu/patiented/articles/who_gets_periodontal_disease_000024_4.htm
2. Steinberg BJ. Women's oral health issues. J Calif Dent Assoc. 1999; 28 (9): 663-667.
3. Soory M. Hormonal factors in periodontal disease. Dent Udate. 2000; 27 (8): 380-383.
4. Blagojevic D, Brkanic T and Stojic S. Oral health in pregnancy. Med Prelg. 2002; 55: 203-216.
5. Krejci CB and Bissada NF. Women's health issues and their relationship to periodontitis. J Am Dent Assoc. 2002; 133 (3): 323-329.
6. Mascarenhas P, Gapski R, Al-Shammari K, Wang HL. Influence of sex hormones on the periodontium. J Clin Periodontol. 2003; 30: 671–681.
7. Marsh P and Martin M. 1992. Oral Microbiology. London, New York, Tokyo, Melbourne, Madras: Chapman & Hall. 1992; pp167-196.
8. Zachariasen RD. Ovarian hormones and gingivitis. J Dent Hyg. 1991; 65(3): 146-150.
9. Zachariasen RD. The affect of elevated ovarian hormones on periodontal health: oral contraceptives and pregnancy. Women health. 1993; 20(2):21-30.
10. Tilakarantne A, Soory M, Ranasinghe AW, Crea, S.M.X., Ekanayake, S.L. & De Silva, M. Periodontal disease status during pregnancy and 3 months post-partum, in a rural population of Stri-Lankan women. J Clin Periodontol. 2000; 27:787-792.
11. Champagne CM, Madianos PN, Lieff S, Murtha AP, Beck JD and Offenbacher S. Periodontal medicine: emerging concepts in pregnancy outcomes. J Acad Periodontol. 2000; 2: 9-19.
12. Williams CE, Davenport ES, Sterne JA, Sivapathasundaram V, Fearne JM, and Curtis MA. Mechanisms of risk in preterm low-birth weight infants. Periodontol. 2000; 73: 178-182.
13. Louro PM, Fiori HH, Filho PL, Steibel J and Fiori RM. Periodontal disease in pregnancy and low birth weight. J Pediatr. 2001; 77: 23-28.
14. Jeffcoat MK, Geurs NC, Reddy MS, Godenberg RL, and Hauth JC. Current evidence regarding periodontal disease as risk factors in preterm birth. Ann Periodontol. 2001; 6(1): 183-188.
15. Mitchell-Lewis D, Engebretson SP, Chen J, Lamster IB and Papapanou PN. Periodontal infection and pre-term birth: early finding from a cohort of young minority women in New York. Eur J Oral Sci. 2001; 109(1): 34-39.
16. Offenbacher S, Katz V, Fertik G, Collins J, Boyd D, Maynor G, McKaig R and Beck J. Periodontal infection as a possible risk factor for preterm low birth weight. J Periodontol. 1996; 67(10): 1103-1113.
17. Offenbacher S, Jared HL, O'Reilly PG, Wells SR, Salvi GE, Lawrence HP, et al. Potential pathogenic mechanisms of periodontitis associated pregnancy complications. Ann Periodontol. 1998; 3: 233-250.

18. Offenbacher S, Beck JD, Lieff S and Slade G. Role of periodontitisb in systemic health: spontaneous preterm birth. J Dent Educ. 1998 ; 62 : 262-279.

19. Offenbacher S, Lieff S, Boggess KA, et al. Maternal periodontitis and prematurity. Part I: obstetric outcome of prematurity and growth restriction. Ann periodontal. 2001; 6: 164-174.

20. Lopez NJ, Smith PC, and Gutierrez J. Higher risk of preterm birth and low birth weight in women with periodontal disease. J Dent Res. 2002; 81(1): 58-63.

21. McGaw T. Periodontal disease and preterm delivery of low-birth-weight infants. J Can Dent Assoc. 2002; 68(3): 188-192.

22. Russell S, and Dasanayake AP. Maternal periodontal disease is related to preterm low birth weight delivery in a group of Brazilian women. J Evid Dent Pract. 2006; 6: 236-237.

23. Lin D, Moss K, Beck JD, Hefti A and Offenbacher S. Persistently High Level of Periodontal Pathogens Associated with Preterm Pregnancy outcome. J. Periodontal. 2007; 78: 833-841.

24. United Nations Children's Fund and World Health Organization. 2004. Low Birthweight: Country, regional and global estimates. UNICEF, New York.

25. Vogel I, Thorsen P, Curry A, Sandager P and Uldbjerg N. Biomarkers for prediction of preterm delivery. Acta Obstet Gynecol Scand 2005; 84: 516-525.

26. Davenport ES, William CE, Sterne JA, Sivapathasundram V, Fearne JM, and Curtis MA. The East London study of Maternal Chronic Periodontal Disease and Preterm Low Birth weight infants: Study design and prevalence data. Ann Periodontol. 1998; 3 (1): 213-221.

27. Steer P. The epidemiology of preterm labor. BJOG 112 suppl. 2005; 1:1-3.

28. Shapiro S, Mccormick MC, Starfield BH, Krisher JP and Bross D. Relevant of carrelates of infant death for significant morbidity at 1 year of age. Am J Obstet Gynecol. 1980; 136(3): 363-373.

29. Child Health Research Project Special Report.. "Reducing Perinatal and Neonatal Mortality.". 'Meeting Report, vol. 3, no 1. Baltimore, Maryland, May 10–12, 1999.

30. Mathew TJ and MacDorman MF. Infant Mortality Statistics from the 2003 Period Linked Birth/Infant Death Data Set. 'National Vital Statistics Reports, vol. 54, no 16. Hyattsville, Maryland: National Center for Health Statistics, 2006

31. Offenbacher S, Lin DM, Strauss R et al. Effects of periodontal therapy during pregnancy on periodontal status, biological parameters, and pregnancy outcomes: A pilot study. J Periodontol. 2006; 77: 2011-2024.

32. Hill GB. Preterm birth: association with genital and possibly oral microflora. Ann Periodontol. 1998; 3:222-232.

33. Dasanayake AP, Byd D, Madianos PN, Offenbacher S and Hills E. The association between Porphyromonas gingivalis-specific maternal serum IgG and low birth weight. J Periodontol. 2001; 72(11):1491-1497.

34. Madianos PN, Lieff S, Murtha AP, Boggess KA, Auten RL, Beck JD and Offenbacher S. Maternal periodontitis and prematurity. Part II: Maternal infection and fetal exposure. Ann Periodontol. 2001; 6:175-182.

35. Dörtbudak O, Eberhardt R, Ulm M and Persson R. Periodontitis, a marker of risk in pregnancy for preterm birth. J Clin Periodontol. 2005; 32:45-52.

36. Jarjoura K, Devine PC, Perez-Deboy A, Herrera-Abreu M, D'Alton M and Papapanou PN. 2005. Markers of periodontal infection and preterm birth. Am J Obstet Gynecol. 2005; 192: 513-519.

37. Angel M. Caring for Women's Health – What is the problem? The New England Journal of Medicine. 1993; 329: 271-272.

38. Schiebinger L. Women's health and clinical trials. J Clin Invest. 2003; 112: 973-977.

39. Gilbert WM, Nesbitt TS and Danielsen B. The Cost of prematurity: Quantification by Getstational Age and Birth Weight. Obstet Gynecol. 2003; 102:488-492.