

A population-based cohort study of oral health in South Brazil: The Porto Alegre Study

Um estudo de coorte de base populacional de saúde bucal no sul do Brasil: Estudo de Porto Alegre

Alex Nogueira Haas¹, Eduardo José Gaio¹, Marcius Comparsi Wagner¹, Fernando Silva Rios¹, Ricardo dos Santos Araujo Costa¹, Cassiano Kuchenbecker Rösing¹, Rui Vicente Oppermann¹, Jasim Albandar^{II}, Cristiano Susin^{III}

ABSTRACT: Few population-based cohort studies have been established in Dentistry and this is especially true for Latin America. We conducted a population-based prospective study focusing on oral health in Porto Alegre, south Brazil, and herein we describe its methodology and discuss directions for further research. The cohort was established in 2001 using a multistage probability sample of 1,465 toothed and 121 edentulous subjects. A 5-year follow-up was performed in 2006 that included 755 individuals. The main aim of this study was to determine the pattern and risk factors for periodontal disease progression and tooth loss incidence. A full-mouth protocol was used including periodontal assessments at six sites per tooth. Primary outcomes were periodontal attachment loss and tooth loss. Oral mucosal lesions, dental plaque, gingivitis, supragingival calculus, probing depths, gingival recession, and dental caries were also assessed. This is the first population-based cohort study to focus on periodontal disease in Latin America. Findings will contribute to our understanding of the epidemiology of periodontal disease and provide valuable data for the planning and implementation of preventive and therapeutic strategies.

Keywords: Periodontal disease. Risk factor. Cohort study. Periodontal attachment loss. Epidemiology. Brazil.

¹Department of Periodontics, School of dentistry of *Universidade Federal do Rio Grande do Sul* – Porto Alegre (RS), Brazil.

^{II}Periodontal Diagnostics Research Laboratory, Department of Periodontology and Oral Implantology, Temple University – Philadelphia (Pennsylvania), USA.

^{III}Laboratory for Applied Periodontal and Craniofacial Regeneration, Departments of Periodontics and Oral Biology, Georgia Regents University, College of Dental Medicine – Augusta (Georgia), USA.

Corresponding author: Alex Nogueira Haas. Rua Ramiro Barcelos, 2492, Bom Fim, CEP: 90035-003, Porto Alegre, RS, Brazil. E-mail: alexnhaas@gmail.com

Conflict of interests: nothing to declare – **Financial support:** CAPES 1614/99-1, FAPERGS PPSUS-0700481.

RESUMO: Poucos estudos de coorte de base populacional têm sido estabelecidos em Odontologia e isso é especialmente verdade para a América Latina. Nós conduzimos um estudo prospectivo de base populacional focando em saúde bucal em Porto Alegre, sul do Brasil, e aqui descrevemos a metodologia do estudo e discutimos direções futuras da pesquisa. A coorte foi estabelecida em 2001 utilizando uma amostra probabilística múltiplo-estágio de 1.465 dentados e 121 desdentados. Um acompanhamento de 5 anos foi realizado em 2006 e incluiu 755 indivíduos. Os objetivos principais do estudo foram determinar o padrão e os fatores de risco para progressão de doença periodontal e incidência de perda dentária. Um protocolo de exame de boca completa foi utilizado, incluindo registros periodontais em 6 sítios por dente. Os desfechos primários foram perda de inserção periodontal e perda dentária. Lesões de mucosa bucal, placa visível, gengivite, cálculo supragengival, profundidade de sondagem, recessão gengival e cárie dentária também foram acessados. Este é o primeiro estudo de coorte de base populacional a focar em doença periodontal na América Latina. Os achados deste estudo contribuirão para o entendimento da epidemiologia da doença periodontal e fornecerão dados valiosos para planejamento e implementação de estratégias preventivas e terapêuticas.

Palavras-chave: Doença periodontal. Fator de risco. Estudo de coorte. Perda de inserção periodontal. Epidemiologia. Brasil.

This note describes a prospective population-based cohort study, with 5 years of follow-up, on oral health in Porto Alegre, Brazil. Studies of this kind are rare in Dentistry, especially in Periodontology, because urban samples are very difficult to follow due to their mobility and because long research periods often result in loss to follow-up. This was the first population-based study conducted with a Latin American sample, which assessed extensively the progression of periodontal disease in the medium to long term. Detailed information is available in recent publications^{1,2}.

COHORT OBJECTIVES

The main purpose of this cohort study was to determine the pattern and rate of progression of periodontal disease after a 5-year follow-up, as well as the risk factors associated with it. In addition, it also aimed to establish the incidence and risk factors of tooth loss.

TARGET POPULATION AND SAMPLE

The target population comprised more than 3 million inhabitants of the metropolitan region of Porto Alegre, Brazil. A multistage random sample was used in 2001 to establish a representative cohort of 1,586 subjects aged more than 14 years (mean 37.9 ± 13.3). In 2006, 755 individuals were reassessed. At baseline, of the 20.8% participants were more than 50 years old, 53.6% were male, and 35.8% had low educational level. When the

follow-up was performed 5 years later, these numbers were, respectively, 25.1, 42.2, and 33.3%.

NONRESPONSE

The response rate in this urban cohort was found to be 47.6% (Figure 1). No significant differences were observed between responsive and nonresponsive subjects regarding ethnicity, educational level, and exposure to tobacco. Impact of nonresponse in findings was assessed by the inverse probability approach, considering distribution of sex, age, and educational level. With such a strategy, relative bias did not exceed 4%¹.

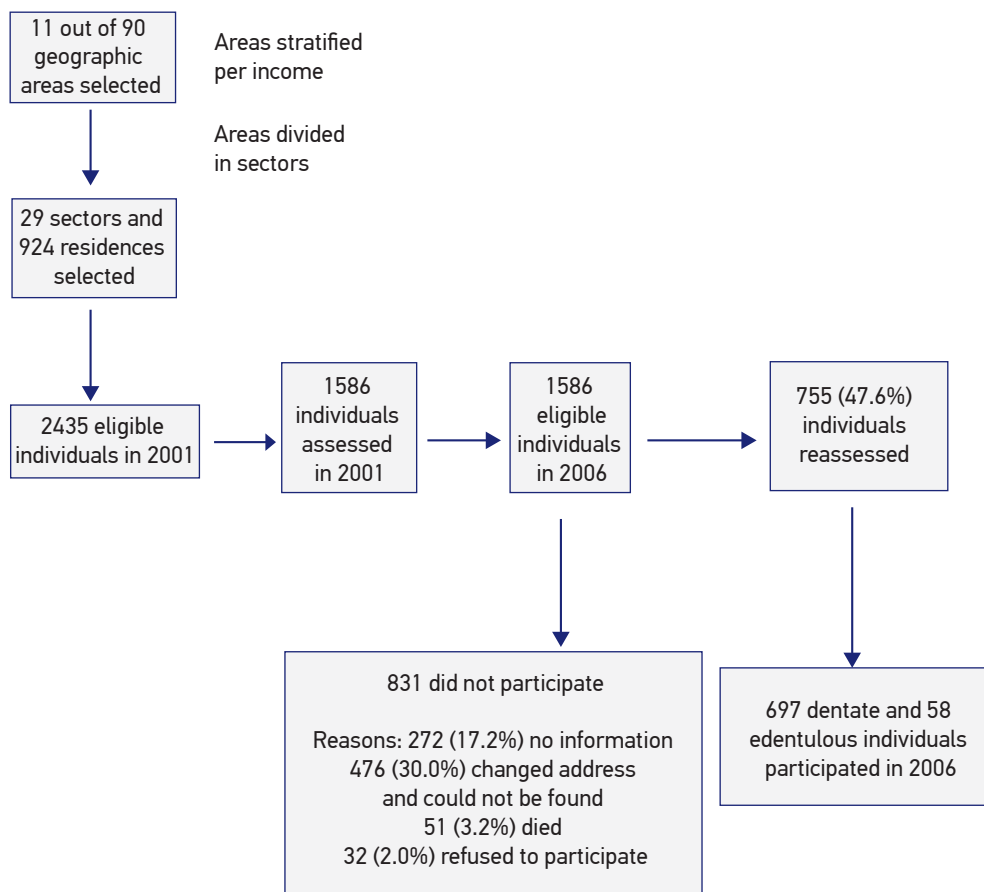


Figure 1. Flowchart of the sample and the response rate of the Porto Alegre Study.

METHODS

Data were collected using a mobile unit; a trailer equipped with dental chair, light, and air compressor. The unit was moved from place to place to conduct interviews and clinical examinations. The same approach was used in the beginning of the study and in the follow-up examination.

A structure questionnaire was applied to access variables related to health, including social and demographic data, socioeconomic level, systemic health, previous dental treatments, oral health-related quality of life, and behavioral variables. The same questionnaire was applied in the beginning of the study and 5 years later.

A full-mouth oral examination protocol in six sites per tooth was applied to access periodontal variables. All permanent teeth, except third molars, were examined using a periodontal probe (PCP10-SE; Hu-Friedy, Chicago, USA). The following oral health indicators were determined: oral mucosal lesions; DMFT; visible dental plaque; gingival bleeding; supragingival calculus; periodontal probing depth; gingival recession; periodontal attachment loss, calculated by the sum of gingival recession and probing depth. Tooth loss was established based on DMFT scores. Consistency of interviews and clinical examinations was assessed in fieldwork at baseline and at follow-up. Kappa values for categorical variables for the interview were 0.93 at the beginning of the study and 0.97 at the follow-up.

Four examiners conducted the initial fieldwork whereas three examiners conducted clinical examinations in the follow-up. Examiners were trained and calibrated before and during fieldworks. Consistency of examiners showed an appropriate agreement for periodontal attachment loss, with weighted kappa values (± 1 mm) ranging from 0.64 to 0.87.

MAIN FINDINGS

Progression of periodontal attachment loss was a finding in more than 50% individuals over 5 years. For example, 56% individuals had progression of periodontal attachment loss ≥ 3 mm in two or more teeth. Although a high percentage of people presented disease progression, few teeth were affected, with mean reaching four teeth with progression. Progression of periodontal disease was related to demographic factors, and a strong social gradient was also observed. In multivariate analysis, male gender, old age, low educational level, and smoking habit were risk factors for progression of periodontal attachment loss after 5 years of follow-up.

FURTHER RESEARCH

Further research based on this cohort study include additional analysis of periodontal disease progression and associated risk factors. Secondary outcomes will also be assessed, including gingival recession and probing depth. Tooth loss along 5 years of follow-up will also be analyzed.

Specifically, the following aspects will be addressed: social, demographic, and behavioral risk factors for periodontal attachment loss progression, alcohol consumption and obesity as risk factors for periodontal attachment loss, genome-wide association studies, impact of partial protocols of periodontal examinations to estimate periodontal disease progression, and incidence of tooth loss and associated risk factors.

REFERENCES

1. Haas AN, Gaio EJ, Oppermann RV, Rösing CK, Albandar JM, Susin C. Pattern and rate of progression of periodontal attachment loss in an urban population of South Brazil: a 5-years population-based prospective study. *J Clin Periodontol* 2012; 39(1): 1-9.
2. Haas AN, Wagner MC, Oppermann RV, Rösing CK, Albandar JM, Susin C. Risk factors for the progression of periodontal attachment loss: a 5-year population-based study in South Brazil. *J Clin Periodontol* 2014; 41(3): 215-23.

Received on: 09/13/2013

Final version presented on: 04/16/2014

Accepted on: 04/25/2014