

Periodontal Diseases Among Quebec Adults Aged 35 to 44 Years

- Jean-Marc Brodeur, DDS, PhD •
- Martin Payette, DDS •
- Mike Benigeri, CD, PhD •
- Anne Charbonneau, DMD, M.Sc., PhD •
- Marie Olivier, DMD, M.Sc. •
- Dominique Chabot, DMD, M.Sc. •

A b s t r a c t

Background: Very little information is available on periodontal diseases in Canadian adults. The purpose of this study was to estimate the prevalence of periodontal problems in Quebec adults aged 35 to 44.

Methods: A total of 2,110 randomly selected Quebec adults were examined between September 1994 and July 1995. The participation rate was 77% for the questionnaire and 44.5% for the oral examination. Measurements for gingival bleeding, calculus, epithelial attachment and periodontal pocket depths were taken for each tooth.

Results: More than 80% of examined persons presented with gingival bleeding on at least one tooth, and 75% presented with calculus on at least one tooth. The CPITN indicated that only 5.2% of individuals had no treatment needs, and that one out of 5 necessitated complex treatment. People with low family income, men and persons living in metropolitan areas are at higher risk of having at least one tooth with a pocket ≥ 6 mm. Dental health behaviours (regular dental visits, brushing and flossing frequency) were not significantly associated with the presence of periodontal pockets. Finally, individuals were relatively unaware of their periodontal problems.

Conclusion: Increasing the population's awareness of periodontal diseases will be a major task for public health workers. The dental profession and the dental industry need to develop awareness campaigns to improve prevention, management and control of periodontal problems. It is especially important to target people at risk, in particular men and low-income groups. As well, dental schools and continuing education courses should focus on this problem with the aim of modifying dental practices.

MeSH Key Words: adult; periodontal index; periodontal diseases; Quebec

© J Can Dent Assoc 2001; 67:34
This article has been peer reviewed.

The prevalence of periodontal problems among adults in industrialized countries has been the subject of several studies. The WHO's compilation of more than 100 studies measuring the Community Periodontal Index of Treatment Needs (CPITN) indicates that most adults present with calculus or gingival bleeding or both, and that depending on the country, 5 to 20% of persons 40 years of age suffer from severe periodontal diseases.¹

In the United States, Douglass and others² reviewed the prevalence of periodontal disease in the population based on the results of 4 national studies (National Health Examination

Survey [NHES] of 1960-62;³ Phase I, National Health and Nutrition Examination Survey [NHANES-I] from 1971-74;⁴ the Research Triangle Institute from 1981;⁵ and the National Institute of Dental Research survey [NIDR] of 1985-86.^{6,7} The authors found that the proportion of adults with periodontal diseases had decreased from 1962 to 1986. However, because these studies used different sampling and measurement methods, it was not possible to know whether the decline was genuine or simply a result of these differences.² Nonetheless, the 4 studies showed that the proportion of persons with periodontal diseases increased with age, and was higher among men.

The NIDR study⁶ examined 15,132 employed Americans aged 18 to 64 years. The study revealed that among individuals aged 35 to 44 years, 17.2% had at least one tooth with a periodontal pocket ≥ 4 mm; 81.3% had at least one tooth with an attachment loss ≥ 2 mm; 42.8% had gingivitis (presence of gingival bleeding on at least one tooth); and 55.2% had calculus on at least one tooth.

Between 1988 and 1991, Phase I of the Third NHANES⁸ study on the dental health of Americans was conducted. For adults aged 35 to 44 years, 1,415 persons were examined. In this population, the results revealed that 60% of individuals had gingivitis (at least one tooth with gingival bleeding) and more than 90% presented with calculus on at least one tooth.⁹ For more severe periodontal problems, prevalence was fairly low: 12.3% of examined persons had at least one tooth with an attachment loss ≥ 5 mm, and 3.8% had at least one tooth with a periodontal pocket ≥ 6 mm.

It is important to note that in the NDIR and NHANES-III studies, the proportion of persons with periodontal pockets was underestimated as measurements were taken on only 2 sites (mesiovestibular and vestibular sites) rather than all around the tooth.¹⁰

In Canada, there are very few studies on the prevalence of periodontal problems among middle-aged adults. Hoover and others^{11,12} did a study of 260 adults aged 19 years and over living in Saskatoon, Saskatchewan. A periodontal examination was done on 6 teeth with 4 sites per tooth. The authors reported that among subjects aged 30 to 44 years, 34% had 4- or 5-mm periodontal pockets and 15% had periodontal pockets ≥ 6 mm. An Ontario study¹³ conducted in 1978 on adults aged 25 to 44 years revealed that adults aged 35 to 44 years had an average of 10.2 sites affected by gingivitis.

The Nutrition Canada National Survey, done in 1971-72,¹⁴ showed that 26% of Canadians aged 19 years and over suffered from serious gingivitis and that 15% had periodontal pockets. Among subjects aged 30 to 39 years, 41% of men and 23.6% of women suffered from severe gingivitis, and 13.2% of men and 7.2% of women had periodontal pockets. The validity of the data on Quebec adults presenting with serious gingivitis and periodontal pockets is questionable, as the results show that Quebecers of all ages had better periodontal health than the majority of Canadians in other provinces. According to the survey report, these results are due to examiner variations rather than any genuine differences in the population's periodontal health.

The purpose of this study was to evaluate the prevalence of periodontal diseases in a representative sample of Quebec adults aged 35 to 44 years and to assess their treatment needs. As well, the study aimed to identify characteristics associated with these problems to determine which groups of individuals are most at risk.

Methods

This cross-sectional study was conducted using a stratified sample of randomly selected census areas and households in Quebec (complete sampling strategy is published elsewhere).^{15,16}

Table 1 Socio-demographic characteristics of people (weighted sample), $n = 2,110$

Variables	%
Age	
35-39 years	51.7
40-44 years	48.3
Sex	
Male	48.7
Female	51.3
Education	
Primary/High school	43.9
Vocational training/College	30.4
University	25.7
Family income	
Less than \$30,000	33.4
\$30,000 to \$59,999	40.1
\$60,000 and more	26.5
Language spoken	
French	84.0
English/Other	16.0
Area of residence	
Metropolitan	33.3
Urban	41.4
Rural	25.3

A total of 2,110 persons aged 35 to 44 years were examined between September 1994 and July 1995. The sample was weighted by area of residence, age, sex and education to represent Quebec's adult population aged 35 to 44 years (Table 1).

Only dentate persons were included in the analyses on periodontal conditions; all teeth were examined except for third molars, which were systematically excluded. Examinations were performed by 10 dentists, each assisted by a person who recorded the data. Premises were rented close to each census zone to facilitate participation. The equipment and instruments used included a portable chair, a portable Rolux light, no. 4 plane mirrors, no. 5 explorers, and WHO's CPITN periodontal probes.¹⁷ An asepsis protocol was developed and strict procedures for infection control were followed. The clinical examinations lasted an average of 40 minutes per adult.

Measurements were made on each tooth for gingival bleeding, calculus and periodontal pocket depth. Periodontal pocket depths were measured from the edge of the free gingiva and all around the tooth (deepest site) to avoid underestimating the prevalence of this problem.¹⁰

Dentist examiners participated in a 9-day training and calibration session. The session focused on the interpretation of indices measuring pathologies sought during clinical examinations. Inter-examiner reliability and agreement with gold standard dentist were assessed during and at the end of the session. The level of concordance for measures relative to periodontal conditions went from moderate to good (mean Kappa index: bleeding, 0.60; calculus, 0.49; periodontal pocket, 0.59).

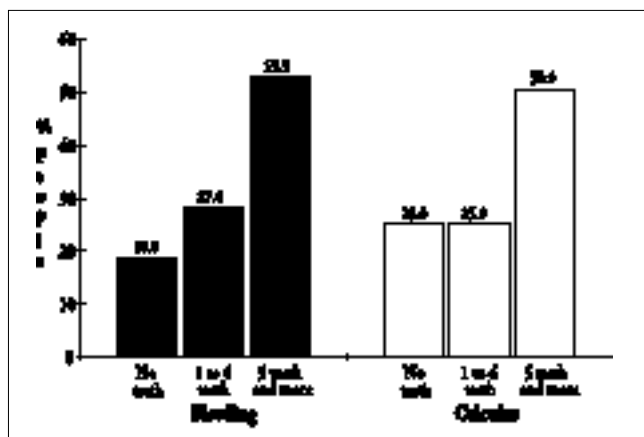


Figure 1: Percentage of people with gingival bleeding and calculus

In addition to the examination, a questionnaire was distributed that included several sections on general and dental health as perceived by the individual, preventive habits, dental services utilization, socio-demographic data, and medical history.

Results

The participation rate was 77% for the questionnaire and 44.5% for the oral examination. There was no significant difference as far as age and last dental visit between those who only answered the questionnaire and those who were examined. On the other hand, those people examined were more often women than men (54.3% vs. 50.8%) and had a higher level of education (27.7% had a university degree vs. 21.6% who did not). Data were weighted to correct this problem.

There is a very high prevalence of calculus and gingival bleeding in this population. More than 80% of examined persons had gingival bleeding on at least one tooth, while more than 50% presented with gingival bleeding on at least 5 teeth. For calculus, these percentages were 75% and 50%, respectively (Fig. 1).

The CPITN, which evaluates a population's periodontal treatment needs, highlighted several phenomena (Table 2). Only 5.2% of Quebec adults aged 35 to 44 years had no treatment needs. As well, 67.8% of individuals were classified in categories 2 and 3, meaning that they presented with calculus or a periodontal pocket of 4 to 5 mm, or both, on at least one tooth. These people require treatment consisting of oral hygiene instruction and scaling. Finally, 21.4% of examined persons had at least one tooth with a periodontal pocket ≥ 6 mm, representing one adult out of 5 with a periodontal lesion requiring complex treatment. Of this last group, 37% had only one tooth with a periodontal pocket ≥ 6 mm; 34% had 2 or 3 teeth with this problem; and 29% had 4 or more.

The prevalence of periodontal pockets ≥ 6 mm was concentrated in a limited group of adults. Indeed, close to 90% of affected teeth were found in only 13.6% of examined persons (those with at least 2 affected teeth). In this last group, individuals had an average of 4.7 teeth with periodontal pockets ≥ 6 mm, compared to 0.7 for the whole of the population.

As indicated in Table 3, the presence of at least one tooth with a periodontal pocket ≥ 6 mm was significantly associated with socio-demographic characteristics (with the exception of age) and

Table 2 Percentage of people according to CPITN categories

CPITN category	Treatment Need	% of people
0: Healthy teeth	None	5.2
1: At least one tooth with bleeding	Oral hygiene instruction	5.6
2: At least one tooth with calculus	Oral hygiene instruction and scaling	15.6
3: At least one tooth with a 4- or 5-mm pocket	Oral hygiene instruction and scaling	52.2
4: At least one tooth with a 6-mm or deeper pocket	Complex treatment	21.4

dental health behaviours. In order to control for potential confounding factors, logistic regression analysis was performed; the dependent variable was the presence of at least one tooth with a periodontal pocket ≥ 6 mm. Table 4 indicates the adjusted odds ratio (OR) and confidence intervals (CI) for independent variables under study. After controlling for potential confounding factors, only sex and family income were associated with this periodontal problem. Men were 1.9 times more at risk than women of having at least one tooth with a periodontal pocket ≥ 6 mm. Individuals with a family income below \$30,000 were 2 times more at risk of having this problem than persons with a family income of \$60,000 or more. Age and language spoken did not appear to be associated with the presence of periodontal pockets. As well, none of the dental health behaviours (regular dental visits, brushing and flossing frequency) were significantly associated with the presence of periodontal pockets.

Finally, this study also showed that persons aged 35 to 44 years were not aware of their periodontal problems. In response to the question: "Do you consider yourself in need of dental treatment for gum problems?" only 26.4% of examined persons with at least one tooth with a periodontal pocket ≥ 6 mm answered "yes." What's more, there was little difference in the perception of periodontal treatment needs between those affected by severe periodontal problems and those with calculus only.

Discussion

This study showed that almost all Quebec adults aged 35 to 44 years who are not completely edentulous have gingival bleeding or calculus or both; that half have at least one tooth with a periodontal pocket of 4 to 5 mm; and that one person out of 5 has a periodontal pocket of ≥ 6 mm. Based on the CPITN, only 5.2% of persons do not require any treatment needs, and one person out of 5 needs complex treatment.

Periodontal diseases are chronic diseases that irreversibly destroy the supporting tissues of teeth, resulting in their eventual loss. Studies on the causes of dental extractions¹⁸⁻²⁰ have shown that even though caries remains the principal cause of tooth loss, periodontal diseases are an important cause of dental extractions among adults over 40 years of age.²¹ With such a high prevalence of periodontal diseases, we can expect an increase in tooth loss as people grow older. In this study, we observed that, on average,

Table 3 Percentage of individuals presenting with at least one tooth with a periodontal pocket \geq 6 mm according to characteristics

	Periodontal pocket \geq 6 mm
Dentate persons	21.4
Sex	
Male	25.8
Female	17.1 ^a
Age	
35-39 years	20.3
40-44 years	22.4 (NS)
Language spoken	
French	20.1
English/Other	27.4 ^b
Family income	
Less than \$30,000	29.0
\$30,000 to \$59,999	18.5
\$60,000 and more	16.9 ^a
Last visit to a dentist	
One year or less	19.1
More than one year	26.4 ^a
Brushing frequency	
Twice a day or more	19.2
Less than twice a day	25.0 ^b
Flossing frequency	
Once a day or more	17.2
Less than once a day	22.2 ^c

p values associated with the Chi-square test:

^a = *p* < 0.001

^b = *p* < 0.01

^c = *p* < 0.05

NS = non significant

individuals aged between 40 and 44 years have 2 teeth less than persons aged 35 to 39 years.

It was surprising that neither brushing nor flossing frequency was associated with periodontal pockets. Quality of brushing and flossing may be more significant than frequency. Moreover, as periodontal diseases are chronic diseases, their presence may be the result of past, rather than present, dental hygiene habits. Finally, a number of other factors, such as calculus, type of mouth bacteria, smoking habits or individual susceptibility, may also play a role in periodontal diseases.

The fact that regular dental visits were not strongly associated with periodontal diseases can be attributed to dental practices, which place little importance on the treatment of periodontal diseases.^{22,23} Bader and Shugars report that in 3 recent studies, dentists conducted complete radiographic examination annually on more than half of their patients, but performed periodontal probing on only 8% of these patients.²² Lack of public awareness regarding periodontal diseases is another problem.²⁴ In our study, only 25% of examined persons with severe problems (at least one

Table 4 Logistic regression: prediction of people with at least one periodontal pocket \geq 6 mm according to characteristics

	Adjusted OR	CI 95%
Sex		
Male	1.9	1.44 - 2.41
Female		
Age		
35-39 years		
40-44 years	1.2	0.92 - 1.49
Language spoken		
French		
English/Other	1.3	0.93 - 1.79
Family income		
Less than \$30,000	2.0	1.46 - 2.74
\$30,000 to \$59,999	1.0	0.76 - 1.43
\$60,000 and more		
Last visit to a dentist		
One year or less	1.3	0.98 - 1.65
More than one year		
Brushing frequency		
Twice a day or more		
Less than twice a day	1.0	0.80 - 1.34
Flossing frequency		
Once a day or more		
Less than once a day	1.1	0.91 - 1.48

tooth with a periodontal pocket \geq 6 mm) perceived a need for periodontal treatment.

Increasing the population's awareness of periodontal diseases will be a major task for public health workers. Dental health professionals and the dental industry need to develop awareness campaigns to improve prevention, management and control of periodontal problems. It is especially important to target people at risk, particularly men and low-income groups. As well, dental schools and continuing dental education courses should focus on this problem with the aim of modifying dental practices. New tools have been developed over the past few years to help dentists diagnose periodontal diseases.²⁵ Research should continue in this direction to help predict the evolution of periodontal disease among individuals at risk. ♦

Acknowledgment: This study was supported by Quebec Health Research Fund Grant 930573-104, Quebec Ministry of Health and Social Services.

Dr. Brodeur is a professor, department of preventive medicine, University of Montreal, Quebec.

Dr. Payette is a public health dentist, Direction of Public Health, Montreal-Centre, Quebec.

Dr. Benigeri is a research assistant, department of preventive medicine, University of Montreal.

Dr. Charbonneau is professor, faculty of dentistry, University of Montreal.

Dr. Olivier is a public health dentist, Direction of Public Health, Montreal, Quebec.

Dr. Chabot is a public health dentist, Direction of Public Health, Montreal, Quebec.

Correspondence to: Dr. Jean-Marc Brodeur, Department of Preventive Medicine, University of Montreal, P.O. Box 6128, Station Centre-Ville, Montreal, QC H3C 3J7. E-mail: Jean-Marc.Brodeur@umontreal.ca.

References

1. Miyazaki H, Pilot T, Leclercq MH, Barmes DE. Profiles of periodontal conditions in adults measured by CPITN. *Int Dent J* 1991; 41(4):74-80.
2. Douglass CW, Fox CH. Cross-sectional studies in periodontal disease: current status and implications for dental practice. *Adv Dent Res* 1993; 7(1):25-31.
3. Kelly JE, Van Kirk LE. Periodontal disease in adults, United States 1960-62. National Center for Health Statistics, Vital and Health Statistics, PHS Pub. No. 2000, Series 22, No. 12. Public Health Service. Washington (DC): US Government Printing Office. 1965.
4. Kelly JE, Van Kirk LE. Basic data on dental examination findings of persons 1-74 years, United States, 1971-74. National Center for Health Statistics, Vital and Health Statistics, Series 11, No. 214, DHEW Pub. No. 79-1662. Washington (DC): US Government Printing Office. 1979.
5. Brown LJ, Olivier RC, Loe H. Periodontal diseases in the U.S. in 1981: prevalence, severity, extent and role in tooth mortality. *J Periodontol* 1989; 60(7):363-70.
6. Miller AJ, Brunelle JA, Carlos JP, Brown LJ, Loe H. Oral health in United States adults. National findings. The national survey of oral health in US employed adults and seniors: 1985-1986. NIH Publication No. 87-2868. Washington (DC): US Department of Health and Human Services. 1987.
7. Brown LJ, Olivier RC, Loe H. Evaluating periodontal status of US employed adults. *J Am Dent Assoc* 1990; 121(2):226-32.
8. Centers for Disease Control and Prevention, NCHS (1994). Plan and operation of the Third National Health and Nutrition Examination Survey. Hyattsville (MD): Department of Health and Human Services, Publication No. (PHS) 94-1308, Series 1, No. 32.
9. Brown LJ, Brunelle JA, Kingman A. Periodontal status in the United States, 1988-1991: Prevalence, extent, and demographic variation. *J Dent Res* 1996; 75 Spec No:672-83.
10. Stoltenberg JL, Osborn JB, Pihlstrom BL, Hardie NA, Aeppli DM, Huso BA and others. Prevalence of periodontal disease in a health maintenance organization and comparisons to the national survey of oral health. *J Periodontol* 1993; 64(9):853-8.
11. Hoover J, Tynan J. Application of the Community Periodontal Index Treatment Needs (CPITN) in a group of Canadian adults. *Oral Health* 1986; 76:13-5.
12. Hoover JN, Tynan JJ. Periodontal status of a group of Canadian adults. *J Can Dent Assoc* 1986; 52(9):761-3.
13. Hunt AM, Lewis DW, Banting D, Foster MK. Ontario dental health survey-1978. *J Can Dent Assoc* 1980; 46(2):117-24.
14. Bureau of nutritional sciences. Dental Report. Ottawa, 1977.
15. Brodeur JM, Payette M, Olivier M, Chabot D, Benigeri M, Williamson S. Étude 1994-1995 sur la santé bucco-dentaire des adultes québécois de 35-44 ans. Québec: Ministère de la Santé et des Services sociaux, 1998.
16. Gough H. Proposed sampling strategy for the national dental epidemiological survey (Report). Ottawa: Statistics Canada, 1992.
17. World Health Organization. Oral health surveys, basic methods. 3rd ed. Geneva, 1987.
18. Hand JS, Hunt RJ, Kohut FJ. Five-year incidence of tooth loss in Iowans aged 65 and older. *Community Dent Oral Epidemiol* 1991; 19(1):48-51.
19. Niessen LC, Weyant RJ. Causes of tooth loss in a veteran population. *J Public Health Dent* 1989; 49(1):19-23.
20. Bailit HL, Braun R, Maryniuk GA, Camp P. Is periodontal disease the primary cause of tooth extraction in adults? *J Am Dent Assoc* 1987; 114(1):40-5.

21. Reich E, Hiller KA. Reasons for tooth extraction in the western states of Germany. *Community Dent Oral Epidemiol* 1993; 21(6):379-83.
22. Bader JD, Shugars DA. Variation, treatment outcomes, and practice guidelines in dental practice. *J Dent Educ* 1995; 59(1):61-95.
23. Eaton KA. Awareness of periodontal diseases: the professional and the civil servant. *Int Dent J* 1998; 48(3 Suppl 1):248-55.
24. Croxson LJ. Practical periodontics. Awareness of periodontal diseases — the patient. *Int Dent J* 1998; 48(3 Suppl 1):256-60.
25. Ishikawa I, Arakawa S. Awareness of periodontal diseases — the role of industry. *Int Dent J* 1998; 48(3 Suppl 1):261-7.

C D A R E S O U R C E C E N T R E

Computer searches on any aspect of periodontal disease are available at no charge to CDA members. The search will generate a list of articles (including abstracts) that appear in dental journals. For more information, please contact us at tel.: 1-800-267-8354 or (613) 523-1770, ext. 2223; fax: (613) 523-6574; e-mail: info@cda-adc.ca.