Journal of Clinical Periodontology
Official Journal of The European Federation of Periodontology
Founded by the British, Dutch, French, German, Scandinavian, and Swiss Societies of Periodontology

J Clin Periodontol 2008; 35: 768–772 doi: 10.1111/j.1600-051X.2008.01294.x

Journal of Clinical Periodontology

Periodontal health status and smoking among young adults

Yuval Vered, Alon Livny, Avi Zini and Harold D. Sgan-Cohen

Department Community Dentistry, Hebrew University-Hadassah School of Dental Medicine, Jerusalem, Israel

Vered Y, Livny A, Zini A, Sgan-Cohen HD. Periodontal health status and smoking among young adults. J Clin Periodontol 2008; 35: 768–772. doi: 10.1111/j.1600-051X.2008.01294.x.

Abstract

Aim: Our aim was to evaluate the periodontal status and present smoking habits among a representative sample of young adult Israelis and to investigate possible associations.

Material and Methods: A representative sample of young adult Israelis was examined and interviewed on the day of release from compulsory military service. Collected data included demographic background (gender, education level, family size and father's country of origin) and current smoking habits. Clinical examination included the recording of periodontal health status according to the Community Periodontal Index (CPI).

Results: Seven thousand and fifty-six young adults were examined. Sixteen per cent were classified as CPI 0, 78% as CPI 1–2 and 6% as CPI 3–4. In total, 36% of the sample reported a current smoking habit. Periodontal status was significantly improved among non-smokers, females and children of fathers born in Israel or Western countries.

Conclusion: Only 7% of the participants demonstrated signs of periodontitis and most young adults did not smoke; a dose–response association was revealed between present smoking habits and periodontal disease.

Key words: CPI; gingivitis; Israel; periodontal disease; periodontitis; smoking; young adults

Accepted for publication 9 June 2008

Periodontal disease is the second-most prevalent oral pathology, after dental caries, and has been described among populations of all ages throughout the world (Petersen 2003b, Burt 2005). A wide range of factors has been demonstrated as significantly associated with periodontal disease, including dental plaque, systemic diseases, medications, psychosocial factors and smoking (Haffajee & Socransky 1994, Hujoel et al. 2003, Pihlstrom et al. 2005, Nicolau et al. 2007, Peruzzo et al. 2007).

Research has demonstrated that cigarette smoking is one of the foremost risk factors related to the prevalence and severity of periodontal disease (Amarasena et al. 2002, Hujoel et al. 2003, Petersen 2003a). Studies have reported an increased prevalence and severity of periodontitis, greater marginal bone loss, deeper periodontal pockets, more severe attachment loss and more teeth with furcation involvements among adult smokers (Johnson & Bain 2000, Petersen 2003a).

Periodontal disease is chronic by nature and generally recognized as more specific to the adult population. Although smoking is more commonly recognized among middle-aged and older adults, studies have demonstrated an increasing level among teenagers and young adults (Warren et al. 2000). The reported associations between smoking and periodontal disease among young people have been contradictory and confusing. Several studies have shown higher levels of gingival bleeding, periodontal attachment damage, gingival recession and alveolar bone loss among young smokers compared with young non-smokers (Gunsolley et al. 1998, Hashim et al. 2001, Al-Wahadni & Linden 2003). Other studies, however, have found no significant association among young individuals (Lopez et al. 2001, Muller et al. 2001, 2002). A recent study among a representative sample of 19-year-old Swedish individuals found that smoking did not contribute to the prevalence or severity of periodontal destruction (Romao & Wennstrom 2007).

The epidemiologic data of periodontal disease and its determinants, in Israel, are sparse and insufficient (Sgan-Cohen et al. 1989, 1992, Goultschin et al. 1990, Katz et al. 2000).

Since the 1990s, an oral health component has been included in an ongoing national health survey, conducted among 21-year-old young Israeli adults, which supplies a relatively optimal representative national database. The

Conflict of interest and source of funding statement

There is no conflict of interests.
The study was self-funded by the authors and their institution.

objectives of the present study were to utilize these data for evaluating the periodontal status of young Israeli adults and investigating the association of periodontal health with smoking. The hypothesis was that, compared with smokers, non-smokers would demonstrate improved periodontal health.

Material and Methods

Study population sample

In Israel there is a compulsory military draft for most healthy males and females, with the exception of conscientious objectors, mainly due to religious and ethnic factors. Each year the entire 18-year-old cohort is recruited. Males serve for 3 years and females for 2 years. Male soldiers are therefore released from service at the age of 21 and females at the age of 20. The present sample was derived from soldiers on their day of release from army service and has been considered in previous medical epidemiological surveys as representative of young Israelis in terms of socioeconomic, geographic and cultural variables (Kark & Laor 1992, Lerman et al. 1993, 1995). The systematic representative sampling method, based on personal serial numbers, has been described in a previous study (Sgan-Cohen et al. 2000). The total number of soldiers in the Israel Defence Forces is classified. Each sampled soldier was summoned to the general health surveillance unit, which included a dental examination room. Participation was by consent, neither compulsory nor enforced, which was given by 85–90% of the subjects. Most declinations were due to blood sampling refusal (within the medical component). After examination of the demographic background data among non-participants, no detectable bias was found. Smoking behaviour data among non-participants were not available. The ongoing health survey had been approved by the Internal Review Board for human studies of the Israel Defense Forces Medical Corps.

Clinical examination

The study was conducted over a 4-year period by five examiners (one each year and two in the final year). Training was carried out by one dental epidemiologist (H. S. C.), who periodically (once a month) supervised and calibrated all examiners until attaining inter-examiner agreement levels of at least $\kappa = 0.9$. Dental examinations were performed, throughout the day of medical surveillance, in a pre-assigned room with a dental chair and light and in accordance with the WHO standardized methodology of 1987 (WHO 1987). The WHO Community Periodontal Index (CPI) probe and a plane dental mirror were used for recording periodontal status by the CPI (Ainamo et al. 1982). Dental radiographs were not included.

Independent variables

Data were collected by a self-administered questionnaire and included gender, education level (<12 years, $\geqslant 12$ years), father's country of origin [Israel, Asia, Africa, ''West'' (America and Western Europe) or former USSR], family size (0–3, ≥ 4 siblings) and present smoking habits (0, 1–10, 11–20 and >20 cigarettes/day). Prior smoking duration was not recorded.

Statistical analysis

Periodontal disease levels were descriptively presented according to the average number of sextants with each CPI score by number of cigarettes smoked per day.

CPI scores were operationally divided into three categories: score 0 (healthy), scores 1 and 2 (bleeding and calculus) and scores 3 and 4 (moderate and deep pathologic periodontal pockets). Associations with the independent variables were statistically analysed according to the percentage of individuals with the highest CPI scores.

Univariate analyses of associations were conducted for CPI = 0 *versus* CPI = 1–4, utilizing Pearson's χ^2 test, calculated according to the WINPEPI program (Abramson 2004).

A multi-nominal logistic regression model was constructed, using the SAS package, with the maximal CPI score as the outcome and all potential independent explanatory variables (education, family size, gender, father's origin and smoking). Variables not found to be independently significant in the multinominal logistic regression were excluded from the final model. In order to calculate odds ratios (ORs), CPI scores needed to be dichotomized. Subsequently, scores 0–2 (healthy, bleeding and calculus) were operationally defined as ''healthy'' and scores 3–4 (moderate and deep pathologic pockets) as ''periodontal disease''. ORs were then calculated for being ''healthy'', adjusted for the remaining significant variables. The Wald test was used to determine the effect of each variable category. For all analyses, the level of statistical significance was $p<0.05$.

Results

The study sample comprised 7056 young adults: 3829 (54%) males and 3227 (46%) females. Most of the participants (6440, 91%) had completed 12 years of schooling. About 60% were from families of up to three children, with only 40% belonging to larger families of four children or more. More than one-third (2511, 35%) of the participants' fathers were born in Israel. Only 800 (11%) of the participants' fathers were immigrants from the former USSR, while the rest were almost equally divided between Asia, Africa and Western countries.

As shown in Table 1, 16% of the total subjects demonstrated healthy gingival tissue (CPI score 0), 78% had, at worst, presence of bleeding or calculus (CPI scores 1 and 2), and 6% exhibited shallow and deep periodontal pockets (CPI scores 3 and 4).

Table 1 summarizes the univariate associations between periodontal status and independent demographic variables (gender, father's origin, family size and education level). Males demonstrated worse periodontal status, as reflected by the twice as high fraction of maximal CPI scores (3–4) as compared with females (8% *versus* 4%) and almost half the fraction of healthy gums (12% *versus* 20%). The differences between healthy males and females reached statistical significance (Pearson's χ^2, $p<0.0001$).

Subjects whose fathers were born in Israel or in ''Western'' countries tended to be healthier (CPI 0 = 18%) compared with those from other origins (11–14%). Differences were also evident for CPI 1–2, with subjects originating from Asia and the former USSR demonstrating higher levels (80% and 84%) than subjects from the West, Israel and Africa (75%, 76% and 77%, respectively). The differences for higher CPI scores (3–4) were less evident. The differences between healthy young adults by father's origin reached statistical significance (Pearson's χ^2, $p<0.0001$).

Subjects who completed 12 years of school were more likely to be healthy than those with a lower educational level (16% *versus* 10%), and less likely to have periodontal disease (CPI = 3–4: 6% *versus* 10%). These differences reached statistical significance ($p = 0.0004$). The distribution of subjects by CPI scores according to the number of siblings in families was not statistically different.

Most of the participants (4503, 64%) reported themselves as non-smokers, while the rest (36%) reported smoking in varying frequencies: 1168 (17%) smoked <10 cigarettes a day, 1008 (14%) smoked 11–20 cigarettes a day and 311 (4%) reported smoking >20 cigarettes daily. No differences were detected by age (the whole sample was of similar age).

Table 2 demonstrates periodontal health status, according to smoking levels. As smoking increased, a consistent decrease in periodontal health (CPI 0) was found, together with increases of higher CPI scores (Pearson's χ^2, $p<0.0001$).

The same association is also illustrated in Fig. 1, with periodontal health status presented as the average number of dentition sextants with CPI scores. A similar trend is evident with increased number of cigarettes smoked per day: the average number of sextants with CPI 0 decreased, while the average numbers with CPI 2 and 3 increased.

The multi-nominal logistic model revealed no associations between maximal CPI scores and levels of education or family size. These variables were therefore excluded from the final model and are not presented.

Table 3 shows (in a multi-nominal logistic regression model, controlling for all variables) that females were 1.79 times more likely to be ''healthy'' (CPI 0–2) than males ($p<0.0001$). Young adults whose fathers originated from African or Asian countries were less likely to be healthy than those whose fathers originated from Western countries (OR = 0.79, 0.81, respectively). The OR for former USSR and Israeli origins was not significant. Origin of father, as a category, achieved statistical significance ($p = 0.006$). In analysis, the significance for the combined model according to likelihood ratio reached a level of $p<0.0001$.

Non-smokers and those smoking 1–10 cigarettes per day were more likely to be healthy than subjects smoking >20 cigarettes per day (OR = 1.64, 1.41, respectively). The OR for those smoking 11–20 cigarettes daily was not significant. Number of cigarettes, on the whole, reached statistical significance ($p<0.0001$).

Table 1. Association between periodontal health and demographic variables

Variable	*n*	CPI = 0, *n* (%)	CPI = 1–2, *n* (%)	CPI = 3–4, *n* (%)	*p*-value*
Gender					
Male	3829	449 (12%)	3070 (80%)	310 (8%)	
Female	3227	644 (20%)	2442 (76%)	141 (4%)	<0.0001
Father's origin					
Israel	2511	430 (18%)	1940 (76%)	141 (6%)	
Asia	1129	150 (13%)	906 (80%)	73 (7%)	
Africa	1349	192 (14%)	1044 (77%)	113 (9%)	<0.0001
West†	1241	225 (18%)	929 (75%)	87 (7%)	
Former USSR	800	90 (11%)	675 (84%)	35 (5%)	
Education level					
1–11 years	599	63 (10%)	478 (80%)	58 (10%)	
12+years	6440	1029 (16%)	5019 (78%)	392 (6%)	0.0004
Number of siblings					
1–3	4241	669 (16%)	3320 (78%)	252 (6%)	
≥4	2801	423 (15%)	2180 (78%)	198 (7%)	0.44
Total	7056	1093 (16%)	5512 (78%)	451 (6%)	

*Pearson's χ^2 test; for CPI 0 *versus* CPI 1–4.
†West: America or Western Europe.
CPI, Community Periodontal Index.

Table 2. Maximal CPI scores by number of cigarettes smoked per day

Number of cigarettes	*n*	CPI = 0, *n* (%)	CPI = 1–2, *n* (%)	CPI = 3–4, *n* (%)
0	4503	784 (18%)	3448 (76%)	271 (6%)
1–10	1168	171 (15%)	926 (79%)	71 (6%)
11– 20	1008	100 (10%)	831 (82%)	77 (8%)
20+	311	29 (9%)	253 (82%)	29 (9%)
Total	7056	1093 (16%)	5512 (78%)	451 (6%)

Pearson's χ^2 test (for CPI 0 *versus* CPI 1–4): $p<0.0001$.
CPI, Community Periodontal Index.

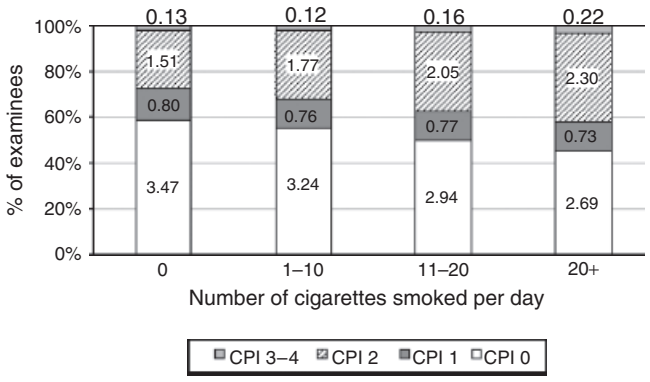

Fig. 1. Average numbers of sextants with Community Periodontal Index (CPI) scores, by smoking levels.

Discussion

Smoking has clearly been implicated as contributing to periodontal breakdown and in impeding healing of periodontal tissues (Johnson & Bain 2000, Petersen 2003a). Research has indicated that the previous popular hypothesis, which suggests that oral hygiene is the pivotal cause of periodontitis, should be questioned and that smoking may be a more important aetiological factor, especially among developing countries (Peto 1992, Prayitno et al. 1993, Amarasena et al. 2002, Hujoel 2003). Moreover, cigarette smoking in many countries has exhibited an alarming increase among adolescents and young adults (Warren et al. 2000, Gilpin et al. 2005, Peterson et al. 2006, Steele et al. 2007).

Table 3. Multi-nominal logistic regression model for the effect of variables on periodontal health

Variable	Odds Ratio*	95% confidence interval	*p*-value†
Gender			
Males	1.00	–	
Females	1.79	1.59–2.01	<0.0001
Father's origin			
West‡	1.00	–	
Africa	0.79	0.65–0.95	
Asia	0.81	0.67–0.99	0.006
Former USSR	0.85	0.69–1.06	
Israel	1.01	0.85–1.19	
Cigarettes per day			
More than 20	1.00	–	
11–20	1.10	0.80–1.52	
1–10	1.41	1.02–1.92	<0.0001
None	1.64	1.21–2.18	

Significance of combined model according to likelihood ratio: $p<0.0001$.
*Odds Ratios (adjusted for all variables) for having ''healthy'' gums (CPI 0–2).
†Wald test, for total variable category.
‡West: America or Western Europe.

Periodontal disease is primarily prevalent among the adult population; however, researchers have indicated that this disease is also common and of importance among young adults, adolescents and even children (Bimstein et al. 2001).

Several epidemiological studies have suggested that the effect of smoking among younger populations is similar to that reported among older people. Researchers have concluded that smoking was associated with accelerated periodontal destruction among young adults, that cigarette smoking should be considered a risk factor for periodontal disease from an early age, and that smoking that has persisted through mid-adolescence and into adulthood will double the likelihood of periodontitis occurring by the mid-twenties (Machuca et al. 2000, Hashim et al. 2001). At the same time, other studies have failed to demonstrate an association between smoking and periodontal destruction among young people (Lopez et al. 2001, Muller et al. 2001, 2002, Romao & Wennstrom 2007). These confusing data indicated a demand for additional research pertaining to this fundamental issue of dental health.

In this study, we used the CPI as recommended by the WHO. CPI is not a perfect measure of periodontal disease and excludes measurement of attachment loss, gingival recession, alveolar bone level and other clinical periodontal parameters. Nevertheless, it was originally proposed as an appropriate estimation of disease in large epidemiological surveys and has contributed to an understanding of the epidemiology of periodontal disease on a global level (Cutress et al. 1986, 1987). Data from the present study may therefore only offer an estimation of the prevalence of moderate or deep periodontal pocketing among young Israeli adults, and not of all clinical disease parameters.

The results of this study confirm a consistent association between smoking and periodontal status among young adults. The prevalence of periodontal destruction (CPI scores 3–4) was relatively low ($N = 451$, 6%); however, this level cannot be disregarded clinically. Despite this low level and the finding that most of the sample was comprised of non-smokers, an unambiguous ''dose–response'' relationship was demonstrated. This relationship was independent of the other investigated variables. Smoking duration was not recorded, and this determinant could not be included in the analysis. In addition, there might have been non-smokers who had previously smoked. These flaws could have presented potential bias, even though the magnitude is speculated as relatively low, considering the young age of the sample. It should be noted that given the small difference between smokers and non-smokers, other factors should be considered, such as oral hygiene and stress.

The multiple regression analysis revealed independent contributions of gender, father's origin and cigarette smoking to periodontal status. In both univariate and multivariate analyses, it was apparent that the more the young adults smoked, the more likely they were to suffer from periodontal disease.

Prevention is always more effective in the primary stage, before or adjacent to the onset of disease.

The present study concluded that a dose–response association existed among young adults between smoking levels and periodontal status. Although this research was conducted in Israel, the conclusions might be generalized to other, similar-aged populations. Dental public health efforts therefore need to include and emphasize the role of smoking, and not only oral hygiene, in primary preventive efforts from an early age.

References

Abramson, J. H. (2004) WINPEPI (PEPI-for-Windows): computer programs for epidemiologists. *Epidemiologic Perspectives and Innovations* **1**, 6.

Ainamo, J., Barmes, D., Beagrie, G., Cutress, T., Martin, J. & Sardo-Infirri, J. (1982) Development of the World Health Organization (WHO) community periodontal index of treatment needs (CPITN). *International Dental Journal* **32**, 281–291.

Al-Wahadni, A. & Linden, G. J. (2003) The effects of cigarette smoking on the periodontal condition of young Jordanian adults. *Journal of Clinical Periodontology* **30**, 132–137.

Amarasena, N., Ekanayaka, A. N., Herath, L. & Miyazaki, H. (2002) Tobacco use and oral hygiene as risk indicators for periodontitis. *Community Dentistry and Oral Epidemiology* **30**, 115–123.

Bimstein, E., Needleman, H. L., Karimbux, N. & Van-Dyke, T. E. (2001) *Periodontal and Gingival Health and Diseases*. London: Martin Dunitz.

Burt, B. (2005) Position paper: epidemiology of periodontal diseases. *Journal of Periodontology* **76**, 1406–1419.

Cutress, T. W., Ainamo, J. & Sardo-Infirri, J. (1987) The community periodontal index of treatment needs (CPITN) procedure for population groups and individuals. *International Dental Journal* **37**, 222–233.

Cutress, T. W., Hunter, P. B. & Hoskins, D. I. (1986) Comparison of the Periodontal Index (PI) and Community Periodontal Index of Treatment Needs (CPITN). *Community Dentistry and Oral Epidemiology* **14**, 39–42.

Gilpin, E. A., White, V. M. & Pierce, J. P. (2005) What fraction of young adults are at risk for future smoking, and who are they? *Nicotine and Tobacco Research* **7**, 747–759.

Goultschin, J., Sgan-Cohen, H. D., Donchin, M., Brayer, L. & Soskolne, W. A. (1990) Association of smoking with periodontal treatment needs. *Journal of Periodontology* **61**, 364–367.

Gunsolley, J. C., Quinn, S. M., Tew, J., Gooss, C. M., Brooks, C. N. & Schenkein, H. A. (1998) The effect of smoking on individuals with minimal periodontal destruction. *Journal of Periodontology* **69**, 165–170.

Haffajee, A. D. & Socransky, S. S. (1994) Microbial etiological agents of destructive periodontal diseases. *Periodontology 2000* **5**, 78–111.

Hashim, R., Thomson, W. M. & Pack, A. R. (2001) Smoking in adolescence as a predictor of early loss of periodontal attachment. *Community Dentistry and Oral Epidemiology* **29**, 130–135.

Hujoel, P. (2003) The smoking-periodontitis association in developing nations. *Community Dentistry and Oral Epidemiology* **31**, 158.

Hujoel, P. P., del Aguila, M. A., DeRouen, T. A. & Bergstrom, J. (2003) A hidden periodontitis epidemic during the 20th century? *Community Dentistry and Oral Epidemiology* **31**, 1–6.

Johnson, N. W. & Bain, C. A. (2000) Tobacco and oral disease. EU-Working Group on

tobacco and oral health. *British Dental Journal* **189**, 200–206.

Kark, J. D. & Laor, A. (1992) Cigarette smoking and educational level among young Israelis upon release from military service in 1988 – a public health challenge. *Israel Journal of Medical Sciences* **28**, 33–37.

Katz, J., Peretz, B., Sgan-Cohen, H. D., Horev, T. & Eldad, A. (2000) Periodontal status by CPITN, and associated variables in an Israeli permanent force military population. *Journal of Clinical Periodontology* **27**, 319–324.

Lerman, Y., Riskin-Mashiach, S., Cohen, D., Slepon, R., Shohat, T., Harari, H., Wiener, M. & Danon, Y. L. (1993) Immunity to measles in young adults in Israel. *Infection* **21**, 154–157.

Lerman, Y., Slepon, R. & Kark, J. D. (1995) The effect of using short versus detailed self-administered questionnaires on the estimate of illicit drug use among young adults. *Drug and Alcohol Review* **14**, 377–384.

Lopez, R., Fernandez, O., Jara, G. & Baelum, V. (2001) Epidemiology of clinical attachment loss in adolescents. *Journal of Periodontology* **72**, 1666–1674.

Machuca, G., Rosales, I., Lacalle, J. R., Machuca, C. & Bullon, P. (2000) Effect of cigarette smoking on periodontal status of healthy young adults. *Journal of Periodontology* **71**, 73–78.

Muller, H. P., Stadermann, S. & Heinecke, A. (2001) Bleeding on probing in smokers and non-smokers in a steady state plaque environment. *Clinical Oral Investigations* **5**, 177–184.

Muller, H. P., Stadermann, S. & Heinecke, A. (2002) Gingival recession in smokers and non-smokers with minimal periodontal disease. *Journal of Clinical Periodontology* **29**, 129–136.

Nicolau, B., Netuveli, G., Kim, J. W., Sheiham, A. & Marcenes, W. (2007) A life-course approach to assess psychosocial factors and periodontal disease. *Journal of Clinical Periodontology* **34**, 844–850.

Peruzzo, D. C., Benatti, B. B., Ambrosano, G. M., Nogueira-Filho, G. R., Sallum, E. A., Casati, M. Z. & Nociti, F. H. Jr. (2007) A systematic review of stress and psychological factors as possible risk factors for periodontal disease. *Journal of Periodontology* **78**, 1491–1504.

Petersen, P. E. (2003a) Global framework convention on tobacco control: the implications for oral health. *Community Dental Health* **20**, 137–138.

Petersen, P. E. (2003b) The World Oral Health Report 2003: continuous improvement of oral health in the 21st century – the approach of the WHO Global Oral Health Programme. *Community Dentistry and Oral Epidemiology* **31** (Suppl. 1), 3–23.

Peterson, A. V. Jr., Leroux, B. G., Bricker, J., Kealey, K. A., Marek, P. M., Sarason, I. G. & Andersen, M. R. (2006) Nine-year prediction of adolescent smoking by number of smoking parents. *Addictive Behaviors* **31**, 788–801.

Peto, R. (1992) Statistics of chronic disease control. *Nature* **356**, 557–558.

Pihlstrom, B. L., Michalowicz, B. S. & Johnson, N. W. (2005) Periodontal diseases. *Lancet* **366**, 1809–1820.

Prayitno, S. W., Addy, M. & Wade, W. G. (1993) Does gingivitis lead to periodontitis in young adults? *Lancet* **342**, 471–472.

Romao, C. & Wennstrom, J. L. (2007) Periodontal conditions in a Swedish city population of adolescents: a comparison between smokers and never-smokers. *Oral Health and Preventive Dentistry* **5**, 105–112.

Sgan-Cohen, H. D., Donchin, M., Goultschin, J., Soskolne, A. & Brayer, L. (1992) Periodontal treatment needs, by CPITN, among employees of a Jerusalem hospital. *International Dental Journal* **42**, 92–96.

Sgan-Cohen, H. D., Katz, J., Horev, T., Dinte, A. & Eldad, A. (2000) Trends in caries and associated variables among young Israeli adults over 5 decades. *Community Dentistry and Oral Epidemiology* **28**, 234–240.

Sgan-Cohen, H. D., Wynn, Z., Avraham, I. & Brayer, L. (1989) Periodontal status by CPITN of 17-year-old Jewish schoolchildren in Jerusalem. *Community Dentistry and Oral Epidemiology* **17**, 273.

Steele, J. R., Raymond, R. L., Ness, K. K., Alvi, S. & Kearney, I. (2007) A comparative study of sociocultural factors and young adults' smoking in two Midwestern communities. *Nicotine and Tobacco Research* **9** (Suppl. 1), S73–S82.

Warren, C. W., Riley, L., Asma, S., Eriksen, M. P., Green, L., Blanton, C., Loo, C., Batchelor, S. & Yach, D. (2000) Tobacco use by youth: a surveillance report from the Global Youth Tobacco Survey project. *Bulletin of the World Health Organization* **78**, 868–876.

WHO. (1987) *Oral Health Surveys: Basic Methods*. Geneva: World Health Organization.

Address:
Alon Livny
Department Community Dentistry
Hebrew University-Hadassah
School of Dental Medicine
PO Box 12272 Jerusalem
91120, Israel
E-mail: alonl@hadassah.org.il

Clinical Relevance

Scientific rationale for the study: Smoking has been identified as a major component in the aetiology of periodontal disease among older adults, but the association among younger populations remains unclear.

Principal findings: Smoking has a significant association with periodontal disease among young adults.

Practical implications: The advent of smoking addiction occurs in childhood and adolescence. Periodontists, dentists and dental hygienists need to be aware of the potential hazardous effect of smoking on periodontal disease from an early age. They should include this important component in their diagnoses and be more committed to smoking prevention.