

Smoking

Smoking and oral health

Smoking as a risk factor

Cigarette smoking is a major risk factor for many illnesses such as lung and cardiovascular diseases, poor pregnancy outcomes, and oral diseases including oral cancers and periodontitis^{1,2,3}.

The role of smoking in the pathogenesis of these diseases is believed to be associated with a deficient host immune function, causing an increased risk of disease and poor wound healing. Smoking also impairs the revascularisation of bone and soft tissues, further impairing healing⁵.

Studies have highlighted the correlation between smoking and periodontal disease, oral cancer and oral mucosal lesions^{3,6,7}.

Periodontal disease

It is estimated that up to 20% of the Australian population suffer from a form of periodontal disease⁸.

Periodontitis is caused by environmental (bacteria) and host related factors. Numerous epidemiological studies have concluded that smoking is also a significant risk factor^{9,10}. Current smokers are 2.5 to 6 times more likely to have periodontitis than non-smokers¹². Former smokers are almost twice as likely to have periodontitis than people who have never smoked^{11,12}. In terms of severity of periodontal disease, a number of studies have confirmed that smokers are three times more likely to suffer from severe periodontitis compared to non-smokers^{13,14,15,16}. There is also evidence that smokers experience greater tooth loss than non-smokers^{17,18}.

Cigarette smoking is the cause of many major general and oral health problems. Smoking is of major interest to dental professionals as it is known to be the risk factor for oral cancer and periodontitis. Smoking also has an unfavourable impact on healing and dental treatment outcome.

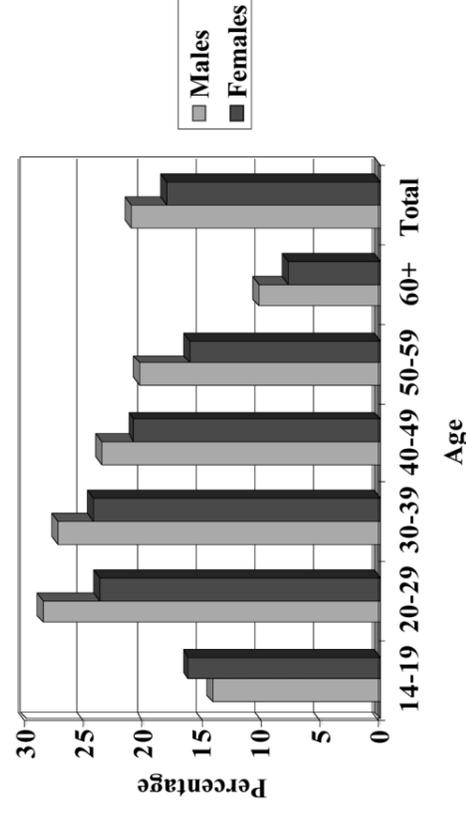
Epidemiology of smoking

The highest rate of smoking is found in males aged 20-29 years (28%) and the highest rate for females is in the 30-39 years age group (24%). The lowest rate of smoking is found among those aged 60+ years. It is disturbing that smoking among adolescents (14-19 years) is greater than ever and is still rising, with more females (16%) taking up the habit than males (14%).

Data from the Australian Institute of Health and Welfare 2001 show that smoking is prevalent in the Australian population, with nearly half (49%) being current or former smokers. In people 14 years and over (Figure 1), 21% of men and 18% of women smoke daily.

The majority of smokers (89%) start in their teenage years; therefore, it is important to target this age group with some prevention strategies.

Tobacco smoking status: proportion of the population that smokes daily by age and sex, Australia 2001



Source: AIHW Australia's Health 2002

References

1. Australian Institute of Health and Welfare. Australia's Health 2002: the seventh biennial health report of the Australian Institute of Health and Welfare. Canberra: AIHW. 2002.
2. Wald NJ, Hackshaw AK. Cigarette smoking: an epidemiological overview. *Br Med Bull* 1996;52:3-11.
3. Winn DM. Tobacco use and oral disease. *J Dent Education* 2001;65:306-12.
4. Barbour SE, Nakashima K, Zhang JB, Tangada S, Hahn CL, Schenkein HA, Tew JG. Tobacco and smoking: environmental factors that modify the host response (immune system) and have an impact on periodontal health. *Crit Rev Oral Biol Med*. 1997;8:437-60.
5. Moseley LH, Finseth F, Goody M. Nicotine and its effect on wound healing. *Plast Reconstr Surg* 1978;61:570-5.
6. International Agency for Research on Cancer. Tobacco smoking. *IARC* 1986.
7. Ong GD. Periodontal disease and tooth loss. *Int Dent J* 1998;48:233-8.
8. Brennan DS, Spencer AJ, Slade GD. Prevalence of periodontal conditions among public-funded dental patients in Australia. *Aust Dent J*. 2001;46(2):114-21.
9. Beck JD, Slade GD. Epidemiology of periodontal diseases. *Curr Opin Perio* 1996;3:3-9.
10. Johnson NW, Bain CA. Tobacco and oral disease. *BDJ* 2000;189:200-6. South Australian Cancer Statistics: Cancers of the respiratory organs, throat and mouth. Centre for Cancer Control Research, Adelaide. Anti-Cancer Foundation of South Australia. May 2002.
11. Johnson GK, Slach NA. Impact of tobacco use on periodontal status. *J Dent Educ* 2001;65:313-21.
12. Tonetti MS. Cigarette smoking and periodontal diseases: etiology and management of disease. *Ann Periodontol*. 1998 Jul;3(1):88-101.
13. Grossi SG, Zambon JJ, Ho AW, Koch G, Dunford RG, Machtei EE, Norderyd OM, Genco RJ. Assessment of risk for periodontal disease. I. Risk indicators for attachment loss. *J Periodontol* 1994;65:260-7.
14. Grossi SG, Genco RJ, Machtei EE, Ho AW, Koch G, Dunford R, Zambon JJ, Hausmann E. Assessment of risk for periodontal disease. II. Risk indicators for alveolar bone loss. *J Periodontol* 1995;66:23-9.
15. Papanou PN. Epidemiology of periodontal diseases: an update. *J Int Acad Periodontol* 1999;1:110-6.
16. Papanou PN. Periodontal diseases: epidemiology. *Ann Perio* 1996;1:1-36.
17. Holm G. Smoking as an additional risk for tooth loss. *J Perio* 1994;65:996-1001.
18. Krall EA, Dawson-Hughes B, Garvey AJ, Garcia RI. Smoking, smoking cessation, and tooth loss. *J Dent Res* 1997;76:1653-9.
19. Tomar SL, Asma S. Smoking attributable periodontitis in the United States: findings from NHANES III. *National Health and Nutrition Examination Survey*. *J Perio* 2000;71:43-51.
20. Bergstrom J, Eliasson S, Dock J. A 10-year prospective study of tobacco smoking and periodontal health. *J Perio* 2000;71:1338-47.
21. Kinane DF. Aetiology and pathogenesis of periodontal disease. *Ann R Australas Coll Dent Surg* 2000;15:42-50.
22. Preber H, Bergstrom J. The influence of cigarette smoking on the development of experimental gingivitis. *J Perio Res* 1986;21:668-76.
23. South Australian Cancer Statistics: Cancers of respiratory organs, throat and mouth. Centre for Cancer Control Research, Adelaide. Anti-Cancer Foundation of South Australia. May 2002.
24. Shenkin JD, Broffitt B, Levy SM, Warren JJ. The association between environmental tobacco smoke and primary tooth caries. *J Public Health Dent*. 2004 Summer;64(3):184-6.
25. Aigne CA, Moss ME, Auinger P, Weitzman M. Association of pediatric dental caries with passive smoking. *JAMA*. 2003 Mar 12;289(10):1258-64.
26. Ah MK, Johnson GK, Kaldahl WB, Patil KD, Kalkwarf KL. The effect of smoking on the response to periodontal therapy. *J Clin Periodontol* 1994;21:91-7.
27. Rosen PS, Marks MH, Reynolds MA. Influence of smoking on long-term clinical results of intrabony defects treated with regenerative therapy. *J Perio* 1996;67:1159-63.
28. Bain CA, Moy PK. The association between the failure of dental implants and cigarette smoking. *Int Oral Maxillofac Implants* 1993;8:609-15.
29. Larsen PE. Alveolar osteitis after surgical removal of impacted mandibular third molars. Identification of the patient at risk. *Oral Surg Oral Med Oral Pathol* 1992;73:393-7.
30. Watt RG, Johnson NW, Wamakulasuriya KA. Action on smoking - opportunities for the dental team. *BDJ* 2000;189:357-60.

Further information

Dental Practice Education Research Unit Dental School,

The University of Adelaide,

South Australia 5005

Phone (08) 8303 5438

Email dperu@adelaide.edu.au

Website // www.adelaide.edu.au/socprev-dent/dperu

Periodontal disease (cont'd)

Among current smokers there is a dose-response relationship between the number of cigarettes smoked per day and the likelihood of periodontitis – the more cigarettes smoked the greater the chances of developing periodontitis¹⁹.

Smoking causes irreversible damage to the periodontium; however, the progress of the disease can be stopped and further damage prevented by cessation of smoking²⁰.

This information can be used as encouragement for smokers to quit the habit. Although the patient, as well as the dental professional, will still need to deal with some dental consequences of smoking, the patient can be reassured that the periodontal disease will not worsen.

Smoking cessation significantly benefits a person's likelihood of tooth retention, but it may take decades for the rate of tooth loss to return to that observed in non-smokers¹⁸.

Gingival tissue

Gingivitis is modified by several factors including smoking²¹. Gums of smokers show:

- fewer gingival inflammatory changes
- reduced bleeding
- a thickened and fibrotic appearance.

The gingival changes are due to a suppressed immune response to plaque that masks the presence of periodontal disease²². **It is important that the dental clinician recognises the condition and performs a thorough periodontal examination to detect signs of periodontal disease.**

Acute necrotizing ulcerative gingivitis (ANUG) occurs more frequently in smokers. Possible explanations for the increased frequency of ANUG in smokers include the vasoconstriction

of gingival blood vessels, reduced activity of leukocytes and proliferation of anaerobic fusospirochaetal microorganisms.

Oral cancer

Studies continue to provide evidence of the strong correlation between smoking and oral cancer. The risk of oral cancer increases with increasing number of cigarettes smoked per year and number of years a person has smoked. After quitting smoking the risk of cancer reduces.

In Australia **3% of all cancers are oral cancers** and the annual death rate from oral cancers is higher than that of cervical cancer. Smokers over 40 years of age who smoked one packet a day for 20 years have 4.4 times the risk of developing mouth cancer. The risk of oral cancers associated with smoking increases further with excessive alcohol consumption²³.

Because oral cancers in the early stages are often treated successfully by excision, it is important that dental clinicians are able to diagnose the early signs.

Early oral lesions are usually asymptomatic and can present as a small white or red area or an ulceration that does not heal for a prolonged period of time. In the final stages an oral cancer usually becomes symptomatic and widespread, with poor survival prognosis.

Other oral mucosal lesions

There are a number of mucosal lesions associated with smoking including leukoplakia and smokers keratosis.

Oral leukoplakia (white patch) is found six times more frequently in smokers than in non-smokers and is dose related. Smoking cessation or reduction has been found to cause regression or disappearance of the lesion²³.

Tooth Extractions

Common oral procedures such as tooth extractions, are also known to be affected adversely by smoking. Tobacco smokers have a significantly greater incidence of complications after an extraction, for example alveolar osteitis²⁴.



Stained teeth with tartar build-up in smoker's mouth

Photo courtesy of Dr R Hirsch University of Adelaide

Dental aesthetics

Discolouration of teeth, restorations or dentures is a common complaint of many smokers. Early decay lesions (white spot lesions) and dentine are prone to discoloration; therefore, the discoloration is even more noticeable if prior white spot lesions are present, dentine is exposed or a patient's oral hygiene is lacking.

Halitosis (oral malodour), which often creates serious personal and social embarrassment for the affected person, may also be associated with tobacco use.

Ninety percent of cases not responsive to periodontal treatment occur in smokers¹¹.

Smokers as dental patients
Assessing risk of dental diseases associated with smoking

Tobacco smoking is recognised as the risk factor or the risk indicator for many oral diseases; therefore, **assessment of a smoking habit should become part of every dental examination.** It is important to be aware of the length of the habit (number of years smoked) as well as the severity (number of cigarettes smoked per day).

It is not uncommon for smokers to underestimate their smoking habits when talking about the number of cigarettes they smoke.

Smoking habit assessment is very important as it helps the clinician to:

- **understand the patient's present and future risk of dental diseases**
- **assess the prognosis and possible complications of any dental treatment that may be carried out**
- **prepare an appropriate treatment plan**
- **explain to the patient treatment options and the limitations associated with smoking**
- **keep the patient's expectations at a realistic level.**

No dental treatment will be successful and long-lasting if the patient is unaware of his or her role in the maintenance phase of the treatment.

Dentist's role in smoking cessation

Smoking is a complex behavioural and psychological issue that must be dealt with in all aspects of health care including dentistry. Dental professionals should not only be able to diagnose smoking related diseases, but should play an active role in both preventing the initiation of smoking and in smoking cessation.

The 'five As' principle of smoking cessation is being promoted by Quit Australia and can be easily adapted to any dental surgery environment. The self-explanatory flow chart included presents various options for how to deal with smokers.

Patient awareness

The majority of smokers are aware of smoking being a risk factor for many general health problems.

Many smokers are however not aware of the wide range of dental consequences of smoking. It is the role of the dental clinician to bring this issue to patients' attention and ensure that an in-depth explanation is given³⁰. If this information is not given to the patient, it may be perceived as 'supervised neglect'.

In spite of an increased awareness of the adverse effects of smoking on oral health, many patients will continue to be smokers; however, they will better understand the reasons for a possibly less than optimal outcome of dental treatment and prognosis.

Failure of some patients to act on advice on smoking cessation should not discourage the dental clinician to continue providing this type of service to patients. Quitting is a process and not a single event. On average, at least five or six attempts to quit are made by a smoker before being successful, and all attempts need to be perceived as a learning experience for all involved.

Dental clinicians need to be aware of the patient's smoking status and steps undertaken by the patient to quit. They also need to provide the patient with appropriate information on the consequences of smoking for oral health and support the patient in the smoking cessation process.

ACKNOWLEDGMENT

Appreciation is extended to Ms Cathryn Gill (former undergraduate student at The University of Adelaide) and to Dr Louise Brown periodontist, for contributions to this material.