Flawed oral health of a non-smoking adolescent suggests smoking in adulthood

Antti J. Saari1, Jukka Kentala2, Kari J. Mattila3

1 JYTA, Tunkkari Health Care Center, Veteli, University of Tampere, Tampere, Finland  
2 Director of Social and Health Services, City of Vaasa, Finland  
3 Center of General Practice, Pirkanmaa Hospital District, University of Tampere, Tampere, Finland

Correspondence: Antti J. Saari, JYTA, Tunkkari Health Care Center, Veteli, University of Tampere, Tampere FI-33014, Finland. Tel: +358 40 737 6511, Fax: +358 331 156 722, e-mail: antti.j.saari@uta.fi

Methods: We used an age cohort born in 1979 (n = 2582) taking part in annual oral health check-ups between the ages of 13 and 15. Self-reported non-smokers were used as the study population. As measures we used decayed, missing or filled teeth/surfaces (DMF) and decayed teeth (D) and smoking behaviour at ages 13–15 and the depending measure was smoking behaviour at the age of 29. Results: Those who were non-smokers at ages 13–15 and had tooth decay (D > 0) in an oral check-up during that period had higher risk (OR (Odds Ratio) 1.88, 95% confidence interval 1.2–2.9) of being a smoker by age 29. Tooth decay at age 15 predicted earlier onset of smoking for those, who became smokers later in life. Dental caries (DMF > 0) was not associated with higher risk of becoming a smoking adult, but those with dental caries at age 13 were more likely to start smoking earlier. Conclusions: Poorer dental health, especially tooth decay in adolescence is a possible indicator of a greater likelihood of transforming from being a non-smoker to a smoker. Dentists should notice this for allocated health promotion.

Introduction

Smoking has devastating effects on our society causing both economic and health related problems.1,2 The initiation of persistent smoking usually occurs in the vulnerable years of adolescence.3–5 Smoking has negative effects on adolescents’ oral health.6,7 Tobacco consumption in any form increases the risk of dental caries8 and a history of smoking predicts root caries.9 Smoking also increases the risk of periodontitis.10,11 Oral health has been found to be a marker of behavioural risk factors.12 However, there are no earlier studies considering the possibility that poor oral health might predict onset of smoking.

The aim of this study was to ascertain if poorer oral health is a possible indicator of those adolescents who are likely to become smokers. Our study hypothesis was that there are more adult smokers among those whose oral health in adolescence was poor.

Methods

During the period 1992–94 an age cohort born in 1979 (n = 2582) underwent annual oral check-ups during which they also responded to questions and a questionnaire about their smoking and attitudes towards smoking.13 We used this age cohort as a subject pool, from which those subjects who self-reported being non-smokers were used as our study population.

Oral check-ups at the age of 13–15

Oral check-ups of the cohort in the period 1992–94 were part of the routine school oral health care. During these check-ups the usual measures of dental health indicators were monitored. These included D (decayed teeth) and DMF (decayed, missing and filled teeth/surfaces) indices, which we used to determine subjects’ oral health in adolescence. The values of these indices were derived directly from the dental records. Those subjects whose DMF was 0 were classified as caries free, whereas others were classified to have dental caries. D indices were used similarly; those subjects whose D was 0 were interpreted to have no decayed teeth, whereas others were interpreted to have at least one decayed tooth.

We used the response to the question ‘Do you smoke?’ in the annual questionnaires completed in 1992–94 to classify the subjects into adolescent smokers (responding ‘Yes’) and adolescent non-smokers (responding ‘No’). The participation numbers of the non-smokers in each check-up are presented in figure 1. We also noted some potential confounders for smoking from the check-up at age 13. These were gender and smoking behaviour of parents.

Follow-up questionnaire at the age of 29

A follow-up questionnaire was mailed to the cohort in 2008 to addresses obtained from the Finnish Population Register Centre.14 At the time of the mailing the cohort was approximately 29 years old. The envelopes also contained cover letters describing the purpose and methodology of the study and a consent form. Only those completed questionnaires accompanied by a signed consent form were included in the study. See figure 1 for non-smoker participant numbers at each oral check-up. Responses to the 2008 follow-up questionnaire were received from 40.3% (n = 972) of those subjects who were reportedly non-smokers at age 13, 44.5% (n = 833) of those subjects who were reportedly non-smokers at age 14 and 45.3% (n = 567) of those subjects who were reportedly non-smokers at age 15.

As adolescents have been shown to vary their smoking behaviour throughout adolescence,15 we used several age points to measure it. The oral health information of non-smoking adolescents at ages 13, 14 and 15 was compared with the information about the subjects’ smoking behaviour at age 29. The subjects for the first analyses were picked using only one measurement on their non-smoker status without paying any attention on their possible earlier or later smoking behaviour. The later analyses used all available information on the subject’s smoking behaviour: The missing data for those who did not participate in 1–2 check-ups did not affect the classification.
while any self-reported smoking at ages 13, 14 or 15 led to exclusion from this later analysis.

In the follow-up questionnaire the crucial question was whether or not the subject had been smoking regularly. This dichotomization was executed using the responses to two different questions. Those respondents answering ‘yes’ to both questions ‘During your life have you smoked more than five packs of cigarettes or cigars or smoked at least the equivalent amount of loose or pipe tobacco?’ (Yes/No) and ‘Do you smoke or have you smoked tobacco products regularly, in other words daily or nearly daily?’ (Yes/No), were classified as smokers. There were also some questions for adult smokers to ascertain the mode of tobacco consumption. We elicited the amount of tobacco products consumed and the age of smoking initiation. The amount of tobacco products consumed was dichotomized to heavy (more than 10 cigarettes per day) or light (1–10 cigarettes per day).

Of those with tooth decay at the first check-up, 19.9% (n = 166) did not participate to later check-ups while only 13.9% (n = 241) of those without tooth decay at the first check-up dropped out. Of those with dental caries at the initial check-up, 17.0% (n = 276) dropped out while only 13.9% (n = 131) of those who had been caries-free at the first check-up dropped out.

We used IBM SPSS version 20.0 for the statistical analysis. We used cross tabulation, χ²-test, t-test for independent samples of age by gender and smoking behaviour of parents when the respondent was 13 years old. The Ethics Committee of the Pirkanmaa Hospital District, Finland, approved the study protocol (R08017).

Results

The proportion of non-smokers dropped from 94.3% to 80.6% during the annual check-ups in the period 1992–94. The dental health indices and smoking behaviour reported at each examination are presented in table 1.

Non-smokers at a cross-sectional check-up

In the first analyses we compared the oral health status of the adolescent non-smokers to their smoking behaviour at the age of 29. Dental caries (DMF>0) at adolescence had no statistically significant association with higher smoking rates in adulthood, regardless of the age during the oral health check-up with this clinical finding (table 2). Having at least one decayed tooth (D>0) at the check-up at age 13 predicted a 1.4 times greater OR of smoking in adulthood compared with those with no decayed teeth at age 13 (P<0.015). At age 14 the OR of smoking in adulthood for those with at least one decayed tooth (D>0) was almost twice as great as that of those without any tooth decay (P<0.001). Tooth decay at the age of 15 was not associated with likelihood to smoke in adulthood. These differences persisted after adjusting for gender and the smoking behaviour of parents. The proportion of heavy smokers did not differ between those with dental caries or decayed teeth and those without. Those adult smokers who had at least one decayed tooth at age 15, started to smoke 1.1 years earlier than those without any decayed teeth at age 15 (initiation at age 16.3 vs. 17.5, P<0.013).

Non-smokers during ages 13–15

In the subsequent analyses, we considered those reporting no smoking at any of the check-ups at ages 13, 14 or 15 as non-smokers in adolescence. There were 2043 respondents who were not smokers at any annual check-up at the ages of 13–15. Of this population, 74.0% (n = 898) had dental caries (DMF>0), 54.3%
(n = 659) had tooth decay (D > 0) in at least one check-up. Logically, all respondents having D > 0, also had DMF > 0.

Univariable analysis showed increased odds for being a smoker in adulthood for both DMF and D index, but after combining them to a multivariate logistic regression with the confounders, the significance of DMF disappeared whereas that of D persisted. Those with tooth decay (D > 0) at any check-up during the age of 13–15 were almost twice as likely to smoke in adulthood compared with those without any tooth decay [OR 1.88, 95% confidence interval (CI) 1.2–2.9].

Tooth decay (D > 0) at the check-up at age 14 predicted almost 2-fold likelihood of being a smoker in adulthood compared with those adolescents with no tooth decay. This difference persisted after adjusting for gender and smoking behaviour of parents (adjusted OR 1.7, 95% CI 1.2–2.4, P = 0.003). Tooth decay (D > 0) at age 13 or 15 showed no statistically significant association with higher smoking rates in adulthood. Heaviness of smoking was not associated with dental caries or tooth decay at ages 13, 14 or 15. Those adult smokers with dental caries at age 13 started to smoke 1.1 years earlier than those without dental caries at age 13 (age 17.0 vs. 18.0, P = 0.036). Those with tooth decay (D > 0) at age 15 started smoking 2.8 years earlier than those without any decayed teeth at age 15 (initiation at age 15.0 vs. 17.8, P = 0.013).

Discussion

Our results suggest that those non-smoking adolescents, who have tooth decay, are more likely to have a greater exposure to tobacco smoking. We received different results from different methods of analysis, but it seems that those with oral health problems may start smoking earlier and are more likely to continue smoking in adulthood (at the age of 29).

A possible explanation for this is that both of these—poorer oral health and adhesion to tobacco smoking—are caused by the same phenomenon. Adolescents have been shown to be reliable with regard to self-reported smoking,16 so it is unlikely that the respondents’ smoking behaviour was determined falsely. Interpretation of DMF index as a marker of dental caries is not straightforward, because there are other states that can explain higher DMF indices (trauma or congenital defects, for example). The age when the oral health indices were measured had a great importance in our study population—age of 14 seemed to be the best time to determine the risk based on the occurrence of tooth decay. We have no knowledge of previous studies with concurrent findings.

In light of our results, we suggest that greater emphasis should be placed on smoking prevention among adolescents with oral health problems. A simple question ‘Do you smoke?’ combined with an oral health check-up seems sufficient to identify those who need help in smoking cessation and those who need help in steering clear of smoking.16 Our results also emphasize the importance of monitoring the oral health of schoolchildren annually. Early detection of oral health problems is important not only for mounting early interventions; these problems also help to identify those individuals who are likely to start smoking. Child health services need to develop to give a better response to the todays’ child health needs.37 Regular follow-up of children’s health gives health professionals many chances to have an effect on their health. Bringing the topic of smoking habits to oral check-ups emphasizes the agenda of health promotion.

In conclusion, poor oral health in a non-smoking adolescent may predict smoking habit in adulthood. This result should be verified in a study using another population since no earlier concurrent findings exist. In future research, anti-smoking strategies should be tested on adolescents with poor oral health regardless of their current smoking behaviour.

Limitations

Half of the cohort received up to four brief tobacco interventions during school age. This is unlikely to cause any bias in our study since the intervention showed no effect in long-term follow-up.14 The response rate to the follow-up in 2008 was satisfactory since no incentive was used. Dropping out of the study after the initial check-ups was more likely if the subjects’ oral health was flawed. Only a small proportion of these dropouts responded to the 2008 questionnaire. Thus it is possible that a group of subjects with oral health problems escaped the attention of our study and the association between poor oral health in adolescence and adult smoking is therefore underestimated.

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Conflicts of interest: None declared.

Key points

- Tooth decay in adolescence can predict the smoking behaviour in adulthood.
- The onset of smoking can occur earlier for those with oral health problems.
- Adolescents with oral health problems should be studied with interventions to prevent the smoking initiation.
- Practitioners should be aware that adolescents with oral health problems might be prone to develop an unhealthy lifestyle.

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Undiagnosed HIV infection in a population of MSM from six European cities: results from the Sialon project

Laia Ferrer1,2,3, Martina Furegato4, Jean-Pierre Foschia4, Cinta Folch1,2,3,5, Victoria González1,2,3,6, Dunia Ramarli7, Jordi Casabona1,2,3,5, Massimo Mirandola8

1 Center for Epidemiological Studies on STI and AIDS of Catalonia (CEEISCAT), Agència Salut Pública de Catalunya (ASPC), Generalitat de Catalunya, Badalona, Spain
2 Institut d’Investigación Germans Trias i Pujol (IGTP), Badalona, Spain
3 CIBER Epidemiología y Salud Pública (CIBERESP), Madrid, Spain
4 Regional Center for Health Promotion, Veneto Region, Verona, Italy
5 Departament de Pediatria, d’Obstetrícia i Ginecologia i de Medicina Preventiva i de Salut Pública, Facultat de Medicina, Universitat Autònoma de Barcelona, Bellaterra (Cerdanyola del Vallès), Spain
6 Microbiology Service, Fundació Institut d’Investigació en Ciències de la Salut Germans Trias i Pujol, Hospital Universitari Germans Trias i Pujol, Universitat Autònoma de Barcelona, Badalona, Spain
7 Immunology Section, Verona University Hospital, Verona, Italy
8 Infectious Diseases Section, Department of Pathology, Verona University Hospital, Verona, Italy

Correspondence: Laia Ferrer Serret, Centre for Epidemiological Studies on STI and AIDS of Catalonia (CEEISCAT), Hospital Universitari Germans Trias i Pujol, Ctra de Canyet s/n, 08916 Badalona, Spain, Tel: 34 934 978 891, Fax: 34 934 978 889, e-mail: lfserret@iconcologia.net

Objectives: The purpose of this article is to assess the distribution of undiagnosed HIV infection in men who have sex with men (MSM) in Southern and Eastern European countries, to describe the differences in epidemiology and behaviour between undiagnosed, diagnosed HIV-positive and HIV-negative MSM and to identify factors associated with undiagnosed HIV infection in the study population. Methods: A multi-centre biological and behavioural cross-sectional study was conducted in 2008. Time–location sampling was used to recruit men attending different venues. A self-administered questionnaire was completed and oral fluid samples were collected to estimate HIV prevalence. Results: HIV prevalence was 17% in Barcelona, 12% in Verona, 6% in Bratislava, 5% in Ljubljana, 5% in Bucharest and 3% in Prague while undiagnosed HIV infection was 47, 62, 67, 83, 85 and 57%, respectively. Diagnosed HIV-positive men reported more casual partners than HIV-negative MSM (mean: 19 and 9, respectively) (P<0.001), and they were more likely to self-reported condyloma in the last year than undiagnosed HIV-positive and HIV-negative men (15, 1 and 3%, respectively) (P<0.001). Factors associated with undiagnosed HIV infection included attending sex-focused venues (OR = 2.49), reporting syphilis in the previous 12 months (OR = 2.56), using poppers at last sexual intercourse (OR = 3.36) and having had an HIV test in the previous year (OR = 2.00). Conclusions: Many HIV infections remain undiagnosed, and there is evidence of the persistence of frequent risk behaviours and sexually transmitted infections (STI) despite knowledge of HIV-positive status, emphasising the need for a multidimensional approach to HIV/STI prevention. Access to HIV testing should be considered a priority in prevention programs targeted at MSM, especially in Eastern Europe.

Introduction

HIV infection remains an important public health issue in Europe, with evidence of increasing transmission in several countries. Men who have sex with men (MSM) remain the group most at risk of acquiring HIV infection in the European Union (EU) and European Economic Area (EEA), accounting for 39% of the 28,038 HIV diagnosis reported in 2011.1,2 In addition to the on-going spread of HIV and the high HIV prevalence in the MSM population, reports of other sexually transmitted infections (STI) and high risk sexual behaviours, such as unprotected anal intercourse (UAI) with partner of unknown or discordant HIV status, continue to increase throughout Europe, highlighting the urgent need to provide enhanced HIV/STI prevention for this population.3–6

It has been estimated that 30% of people living with HIV in the EU are unaware of their infection, and this number could be higher in non-EU countries within Europe, nearing 65%.7 Evidence shows...