Oral Cancer and Tobacco – A Fact Sheet

WHO estimates that in 2009 there was about 1.1 billion adult smokers worldwide representing nearly a quarter (22%) of the global adult population. Tobacco use is a major risk factor for cancers of the oral cavity. Tobacco is used in a variety of ways, mostly as smoked, but many populations use smokeless tobacco, which comes in two main forms; snuff and chewing tobacco. In this fact sheet we present the available evidence on health risks of both smoked and smokeless tobacco, their associations with disease causation, and preventive measures.

Aetiology

Evidence for smoking as a major risk factor for oral cancer is based on 12 case-control studies that have estimated risk in smokers compared with non tobacco users. The pooled risk estimate is 3.43 times higher in smokers (Gandini et al., 2008) (Fig 1). The differential risk between non-smokers and heavy smokers reflects a steady progression of risk with increasing amount smoked (dose response), and therefore, clearly indicates tobacco as a major risk factor for oral cancer. Bedi smoking prevalent in Asia is considered to have a higher risk than cigarette smoking (Rehman et al., 2003) and cigar smoking has been reported to have more or less of equal risk to cigarette smoking. Many types of smokeless tobacco products (ST) are marketed and are widely used in Southeast Asia, Scandinavia (particularly Sweden) and USA and all contain nicotine and nitrosamines. Causal association between use of any type of ST and cancers of the oral cavity has been established (IARC, 2007). Over recent decades there has been debate over whether or not Swedish snuff is carcinogenic in humans. Animal studies, molecular biological and experimental studies have shown the carcinogenic potential of Swedish snuff but this has not been proved in prospective randomised studies (Hirsch et al 2012) published a case series of patients with oral squamous cell carcinomas diagnosed at the sites where the patients had used Swedish snuff for several years.

Fig 1: Forest plot for current smokers and oral cavity cancers. Pooled RR indicates a significant association between tobacco smoking and oral cavity cancers.(Ref 1)

It is evident that oral cancer risk is related to both intensity and duration of tobacco smoking. Furthermore most studies show an inverse relation with age when starting to smoke. Of seven studies that considered age at start of smoking several authors reported a statistically significant trend of increasing risk with decreasing age at starting. Among young people in Southern England, a significant risk among males (alcohol adjusted OR: 19.5, 95%CI 1.3,286.8) was associated with starting to smoke under the age of 16 years (Llewellyn, 2004). These risks are also increased synergistically with alcohol consumption, as discussed in the fact sheet on alcohol.

Over 5300 compounds have been identified in tobacco smoke. The addictive properties of tobacco smoke are attributed to nicotine. There are over 70 carcinogens in tobacco smoke that have been evaluated by the IARC Monographs programme as having sufficient evidence for carcinogenicity in
either laboratory animals or humans. Two main carcinogens present in tobacco smoke are Benzo(a) pyrène and nicotine derived nitrosamines (TSNA). Several lines of evidence indicate that oral cancers arise as a result of mutagenic events (arising mainly from tobacco carcinogens) causing multiple molecular genetic events in many human chromosomes and genes.

Most of the 70 carcinogens in tobacco smoke are procarcinogens that must be activated by phase I enzymes and may then be deactivated by phase II enzymes. Polymorphisms that alter the function of the genes involved in the activation or detoxification of tobacco smoke carcinogens can potentially influence an individual’s risk of developing a tobacco-related cancer.

**Smoking cessation**

Smoking cessation, is associated with the potential for reversal of oral potentially malignant disorders (eg. leukoplakia) and reduced risks for oral cancer. The risk for oral cancer of former smokers approximates that of never smokers after some 10 years of quitting smoking.

A significant reduction of risk of oral cancer has been shown among quitters and follow up studies indicate that the level of risk approaches to that of never smokers approximately 10 years after cessation (Warnakulasuriya et al., 2010). Significant reduction in relative risks of oral cancer following quitting has been demonstrated in several studies from USA, Italy and China, Switzerland and from Brazil. In a meta analysis of these reported studies pooled risk estimates for ex smokers (OR 1.40 CI: 0.99-2.00) were significantly lower compared with current smokers (OR 3.43 CI:2.37-4.94)(Gandini et al., 2008). Stopping smoking before middle age has been shown to reduce the lifetime risk (from 1.4% to 0.5%) of developing oral cancer (Bosetti et al., 2008). These studies indicate that for ex-smokers, the relative risk for oral cancer declines with time since stopping smoking. Similar effects have been demonstrated for oral potentially malignant disorders that recede or resolve following cessation of tobacco use (Roed Petersen et al., 1982; Gupta et al., 1995).

**Conclusion**

Smoking cessation counselling by dental healthcare professionals is effective, cost efficient, and provides benefits to patients. Dental teams in primary care are aware of the importance of offering smoking cessation advice. Many report perceived barriers to the delivery of smoking interventions. Reported barriers include lack of remuneration, time and particularly the limited training received during under-graduate studies (Davies et al., 2010). Given the frequency of contact between smokers and dental professionals, members of the dental team have a unique opportunity to play a significant role in the reduction of tobacco consumption. Indeed, smoking cessation was indicated as an integral part of preventive measures and a way for improving oral health at the 2nd European Workshop on Tobacco Use Prevention and Cessation for Oral Health Professionals (Ramseier et al., 2010). Prevention of oral cancer by provision of tobacco cessation activities and screening by Oral Health Professionals in primary care should be embedded in policies strengthening oral health services (Petersen, 2008).

**References:**


Gupta PC, Murti PR, Bhonsle RB, Mehta FS, Pindborg JJ. Effect of cessation of tobacco use on the incidence of oral mucosal lesions in a 10-yr follow-up study of 12212 users. Oral Diseases 1995; 1: 54-58


