

The relevance of alcohol to dental practice

R. Grocock¹ discusses the impact of alcohol on oral health and how dental professionals can advise patients.

Alcohol is a very widely used drug which can cause dental disease and influence dental treatment. It is therefore important that dental professionals take an alcohol history from all patients and are aware of how to give alcohol reduction advice. This article discusses the impact of alcohol on oral health, including oral cancer, trauma, halitosis, tooth wear, periodontal disease and caries, with reference to the available literature. It also outlines current alcohol risk level advice and guidance regarding giving alcohol reduction advice in a dental setting.

Introduction

After caffeine, alcohol is the second most commonly consumed drug in the United Kingdom.¹ Dentists treat patients on a daily basis who drink alcohol at various levels. It is, therefore, important to appreciate risk levels of alcohol consumption and have an awareness of

current guidelines for giving alcohol reduction advice in dental practice. Alcohol has been linked to many oral health effects. These include oral cancer, caries, periodontal disease, halitosis, tooth wear, staining and trauma. Alcohol also has many other wider effects on the general, social and psychological health of patients, which can influence dental treatment. These include drug interactions, liver disease, cardiovascular disease, and compliance with treatment plans and appointments.

Epidemiology

Twenty-one percent of adults in Great Britain report complete alcohol abstinence, and this percentage is slowly increasing.² Despite the perception, the heaviest drinkers are the middle aged, while those aged 16–24 years old drink the least.³ Furthermore, high earners are more likely to drink more frequently and binge drink, compared to the lowest earners.³

The percentage of adults that binge drink is decreasing, from 18% in 2005 to 15% in 2013, mainly due to a large fall in young people binge drinking.² Men are considered to have binged if they drink more than eight units of alcohol in a day, and women if they drink more than six units.² The percentage of children drinking

alcohol is also at the lowest level since surveys began.

Despite these improving statistics, the number of alcohol related hospital admissions is continuing to increase.² In 2014, there were 8,697 alcohol-related deaths registered in the United Kingdom.⁴ Scotland had the highest alcohol related death rate in the United Kingdom.⁴ In England the rate was significantly higher in the north compared to the south.⁴ Alcohol also has a large economic cost, estimated to be 21 billion pounds to society from alcohol related harm, and 3.5 billion pounds to the NHS a year.⁵

Units

One unit is 10 ml or 8 g of pure alcohol.⁶ Table 1 shows the average number of units in some common alcoholic drinks.⁷

In January 2016, new guidance was issued by the Chief Medical Officers, reducing the limit for the low risk category of alcohol consumption for men to the same level as for women.⁸ Both are now advised not to regularly drink more than 14 units per week. It also states that there is no safe level of alcohol consumption. It recommends that it is best, if you do drink as many as 14 units per week, to spread this evenly

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Table 1 Drink alcohol units⁷

Drink	Units
Small glass of wine	1.6
Medium glass of wine	2.3
Large glass of wine	3.3
Bottle of wine	10
Pint of beer	2.3
Shot of spirit	1
Bottle of alcopop	1.5

over three days or more.⁸ It is also safest to avoid drinking alcohol at all during pregnancy.

In England in 2014, 59% of adults drank at levels indicating a lower risk of harm, 20% drank at an increased risk of harm and 4% drank at higher risk levels.⁹ Table 2 illustrates the unit thresholds associated with each level of risk.⁹ One percent of the population are estimated to be dependent drinkers, defined as a cluster of indicators including a strong desire to drink alcohol, persistent use despite the consequences, a higher priority given to alcohol compared to other activities and physical withdrawal symptoms.¹⁰ It is important for dental professionals to know these limits, so effective screening of patients' drinking habits can be carried out. Appropriate tailored advice can then be given and, if necessary, an onwards referral can be made.

Guidance for dentists

Delivering better oral health advises that the level of alcohol consumption should be ascertained for all patients.¹¹ Medico-legally, it is very important to record alcohol consumption in the patient's notes and record that appropriate feedback and advice has been given to patients. In the event of a claim against a dental professional for missed or delayed referral for oral cancer, this recorded evidence is crucial for a successful defence.¹²

Patients can be categorised into alcohol risk levels by recording total alcohol units consumed per week, as part of a medical history. Alternatively, a screening questionnaire can be used, such as AUDITC. This features three questions based on frequency, amount of alcohol consumed on a typical day and frequency of binge drinking. Patients in the lower risk category should be informed of the lower risk guideline and congratulated. Patients drinking at an increasing risk level should have this fed back to them and be informed of the lower risk guideline. They should then be encouraged to consider the effects of their drinking habits and be offered brief tailored advice about the benefits to their oral and

Table 2 Risk levels of alcohol consumption⁹

Risk category	Definition
Higher risk	Over 35 units per week for women or over 50 units for men
Increasing risk	14 to 35 units weekly for women or 14 to 50 units weekly for men
Lower risk	Regularly drinking no more than 2-3 units per day, weekly limit 14 units

general health of reducing their intake. Simple tips can also be provided such as having several drink-free days each week, alternating alcoholic drinks with a soft drink, only having their first drink after starting to eat, switching to lower strength drinks and using a smaller glass. This brief advice can also be supported by a leaflet. Patients drinking at a higher risk should be informed and given brief advice but also signposted to attend their general medical practitioner or local alcohol support service for further advice and support.

There is good evidence that brief advice in primary care is effective. A Cochrane review found that it consistently led to reductions in alcohol consumption.¹³ Additionally, a

led brief intervention is effective.^{17,18} Therefore dentists do not have to spend large amounts of time giving advice and a team approach can be used, involving dental care professionals, to incorporate this brief advice into a busy practice schedule.

Oral effects

This article will now review the current evidence linking alcohol and oral health. This will enable dental professionals to appropriately advise their patients about the potential benefits to their oral health of reducing alcohol consumption to lower risk levels. Alcohol consumption should also be taken into account when risk stratifying patients for certain oral diseases.

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randomised controlled trial in dental practice found that screening and brief intervention for heavy drinkers resulted in significant reductions in both the quantity and frequency of alcohol consumed.¹⁴

Dentists are in a unique position to access patients who may otherwise not see any other health care professionals, with 51% of the adult population attending an NHS dentist in the last two years.¹⁵ It has been shown that dentists are enthusiastic about giving alcohol advice in practice but see the biggest barriers as being the lack of funding and time constraints.¹⁶ Despite their enthusiasm, only 11.6% of practitioners report giving alcohol reduction advice every day or often.¹⁶ This suggests that more needs to be done to increase alcohol prevention advice in practice and address these barriers. This may include education, training, raising awareness and addressing funding issues.

The Cochrane review also concluded that there was no significant increased benefit when the time spent counselling patients was increased.¹³ It has also been shown that nurse-

Cancer

There is a large body of evidence that alcohol is a major risk factor for oral cancer. It has been estimated that 3.6% of all cancers worldwide, and over 30% of all cases of oralpharyngeal cancer, are attributable to alcohol consumption.¹⁹ A review concluded that heavy alcohol consumption, which was defined as four or more drinks per day, is significantly associated with an increased risk of about 5fold for oral and pharyngeal cancer.²⁰

A meta-analysis reported a dose response relationship, with a risk ratio of 1.32 for drinking alcohol and 2.54 for heavy drinking.²¹ This increased synergistically with smoking with a risk ratio of 2.92 and 6.32 respectively. The relationship was similar in both men and women and there was no significant difference in risk for different types of alcoholic drink consumed.

The mechanism of action for the association between alcohol consumption and cancer is not yet fully understood. Possible explanations include: a genotoxic effect of acetaldehyde,

Table 3 pH of alcoholic and mixer drinks⁴²

Drink	pH
White wine	3
Beer	4
Red wine	3.5
Cider	3.10
Orange juice	3.30
Pepsi	2.49
Coke	2.53
Diet coke	3.39
Lime juice	2.35

Table 4 Sugar content of alcoholic and mixer drinks⁴⁶

Drink	Sugar in grams per 100 grams of the drink
Beer	2.2
Cider	2.6
Liqueurs	24.4
Red wine	0.2
Rose	2.5
White wine	0.6
Sparkling wine	5.1
Cola	10.9

alcohol acting as a solvent for tobacco carcinogens, production of reactive oxygen and nitrogen species, or changes in folate metabolism.²²

Halitosis

Halitosis is difficult to quantify. It is a largely subjective condition, which includes a psychosocial component and may have multiple causes in any one individual. However, alcohol intake has been shown to predict oral malodour, using both self-report and quantitative measures.²³ There has also been shown to be a significant association between increased drinking frequency and oral malodour.²⁴ Additionally, there are increased levels of volatile sulphur compounds in daily drinkers, compared to less frequent drinkers.²⁴ The cause of increased oral malodour with alcohol consumption is not fully known, but proposed mechanisms include the short term effect of the smell of the alcohol itself; increased dry mouth, because alcohol is a diuretic; worse oral hygiene and increased periodontal disease.

Trauma

There is good evidence that alcohol consumption increases the risk of dental and maxilla-facial trauma. A study of patients attending Accident and Emergency for facial injuries found that 55% of injuries by assault were associated with alcohol consumption. This was 11% for falls and 15% for people injured in road traffic accidents. In over 15-year-olds, alcohol was associated with 90% of all facial injuries occurring in bars and 45% on the street. Overall, 22% of all facial trauma was related to alcohol consumption.²⁵

A positive association has also been found between high alcohol consumption and the lifetime risk of dental trauma.²⁶ Additionally, the prevalence of dental trauma is significantly higher in those that binge drink.²⁷

Staining

There is limited evidence linking alcohol and tooth staining. Most studies are *in vitro* rather than being carried out in a clinical setting. Red wine is the main alcoholic drink linked to tooth staining. It is thought that dietary chromogens in the drink are adsorbed to the pellicle, leading to a layer of stained material, which is not easily removed.²⁸ It has been shown that post bleaching, the susceptibility of enamel to red wine staining increases and post bleaching red wine causes greater staining than coffee.^{29,30} Red wine also stains composite more than tea or coffee.³¹

Periodontal disease

There is a large body of evidence suggesting that periodontal disease and alcohol consumption are associated. However, whether a causal link exists is difficult to elucidate due to the large number of confounding factors. The possible mechanism of action is also unknown at present. Tezal *et al.*³² found an odds ratio of 1.65 of having higher gingival bleeding, and 1.36 of having more severe clinical attachment loss in those consuming five or more drinks per week, compared to those consuming fewer than five, after adjusting for confounders. This was 1.62 and 1.44, respectively, for those consuming ten or more drinks per week. However, no difference was found in relation to alveolar bone loss or microorganism composition. This was supported by another cross sectional study, which reported a dose response relationship between clinical attachment loss and alcohol consumption. Odds ratios for risk of attachment loss were 1.22 for five drinks, 1.39 for ten drinks, 1.54 for 15 drinks and 1.67 for 20 drinks per week.³³

Alcohol consumption may have a negative influence on periodontal pathogens and on immunological pro-inflammatory cytokines.³⁴

A review by Amaral *et al.*³⁵ concluded that currently there is evidence to suggest alcohol consumption is a risk indicator for periodontitis. There is a need for further longitudinal studies to determine if alcohol consumption is a true risk factor for periodontal disease. Studies to further investigate the mechanism of any possible causal association are also needed.

Wear

Most studies investigating the effects of alcohol on tooth wear have focused on patients with chronic alcoholism. Although these results cannot be directly applied to the majority of drinkers, they give an indication of the possible effects of alcohol on tooth wear. Patients with chronic alcoholism have significantly more wear.^{36,37} This tends to be mostly erosive in nature, especially affecting the palatal surfaces of upper anterior teeth. It is worse in those with a continuous, rather than episodic, drinking pattern. It has been suggested that this could be a potentially useful marker of patients with alcoholism for dental practitioners.³⁸ It has also been demonstrated that drinks with a greater than 9% alcohol volume can result in the wear of composites.³⁹

The cause of the possible increase in wear with alcohol consumption is yet unknown, but there are several potential mechanisms. It may in part be due to increased vomiting with alcohol consumption. Alcohol has also been shown to induce gastro-oesophageal reflux.⁴⁰ Furthermore, many alcoholic drinks are acidic or are consumed with acidic mixers, which have the potential to cause erosion directly. Table 3 shows the acidity of some alcoholic drinks and mixers.⁴¹

Caries

There is no clear evidence of a causal link between alcohol consumption and caries. There are some studies suggesting an association, but these are limited by multiple lifestyle confounding factors. Most studies also compare alcoholics, rather than reporting results for different risk levels of alcohol consumption, so the results cannot be applied to the majority of the population.

Heaviest drinkers have more decayed tooth surfaces and apical lesions.⁴² Enberg *et al.*⁴³ also found significantly more caries and fewer teeth present in an alcohol dependent group, compared to a control group of social drinkers. However, Dukić *et al.*⁴⁴ found no significant difference in the number of decayed, missing or filled teeth in alcoholics receiving treatment, compared to a control group. They did, however, report a lower unstimulated saliva flow rate and a lower pH of saliva in the alcoholic group. Most alcoholic drinks also contain sugar or

Table 5 Drug reactions with alcohol⁵¹

Drug	Reaction
Metronidazole	Disulfiram-like reaction such as flushing, nausea, vomiting and sweating
Midazolam	Enhanced effect on the central nervous system. May increase drowsiness and sedation, and decrease motor skills
Ibuprofen	Increased risk of gastrointestinal bleeding
Opioids	Enhanced effect on the central nervous system. May increase drowsiness and sedation, and decrease motor skills

are consumed with high sugar mixers. Table 4 shows the sugar content of some typical alcoholic drinks and mixers.⁴⁵ As an example, an average two pints of cider equates to 30 grams of extrinsic sugar, which is the recommended daily limit.⁴⁶

Alcoholic drinks can be a source of fluoride, but this varies markedly depending on the fluoride content of water in the manufacturing location.⁴⁷ The highest fluoride levels are contained in low alcohol percentage drinks such as beers and wines, with the lowest levels in spirits.

High alcohol consumption can also cause immunodeficiency, resulting in slower healing time.⁴⁹ There are also many drugs commonly prescribed in dentistry that can react with alcohol. It is therefore important to check alcohol consumption before prescribing, so they can be prescribed safely and advice can be given regarding avoiding alcohol. Table 5 lists some commonly prescribed drugs that interact with alcohol.⁵⁰

**'PATIENTS THAT ARE DEPENDENT ON ALCOHOL
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Wider issues

There are also many wider health, social and psychological effects of alcohol, which may impact upon dental practice. Patients that are dependent on alcohol may struggle to attend appointments reliably and may struggle to comply with the self-care elements of treatment plans. Higher risk drinkers are at risk of liver impairment, which can result in coagulopathy. It is recommended that high risk drinkers, with a positive bleeding history, have haematological investigations, including a full blood count and coagulation screen, before oral surgery.⁴⁸

Conclusion

Alcohol has many oral and wider health effects, which can impact upon dental practice. It is important to obtain an alcohol history from all patients and use this to guide appropriate preventative advice. This may include brief counselling for those drinking at an increasing level of risk, and onwards referral for high risk drinkers. Targeted preventative advice for oral disease, based partly on their alcohol consumption, must also be given. This fits well with the current direction of travel of dentists being increasingly involved with wider health

issues and working together with other health care professions to provide holistic care to patients. This is also likely to become ever more important, with the future introduction of a new NHS contract, which is likely to be much more orientated towards prevention.

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