Cancer Incidence and Mortality due to Alcohol: An Analysis of 10-Year Data

Abstract:
M Laffoy1, T Mc Carthy1, L Mullen1, D Byrne2, J Martin3
1 National Cancer Control Programme, HSE, Parnell St, Dublin 1
2 Department of Public Health, Dr Steevens Hospital, HSE, Dublin 8

Abstract
Alcohol consumption is causally related to cancer of the upper aero-digestive tract, liver, colon, rectum, female breast and pancreas. The dose-response relationship varies for each site. We calculated Ireland's cancer incidence and mortality attributable to alcohol over a 10-year period. Between 2001 and 2010, 4,585(4.7%) male and 4,593(4.2%) female upper aero-digestive cancer diagnoses were attributable to alcohol. The greatest risk was for the upper aero-digestive tract where 2,823(6.7%) of male and 866(3.5%) of female cases were attributable to alcohol between 2001 and 2010, 1,700(4.6%) of female cancer deaths were attributable to alcohol. Every year between 2001 and 2010, an attributable number of new cancers and cancer deaths were due to alcohol. These cancers are preventable by adhering to Department of Health alcohol consumption guidelines.

Introduction
Alcohol consumption causes 3.8% of global mortality. Europe and America have the highest death rates, 6.5% and 5.6% respectively. The main causes of alcohol related death in European men are cirrhosis (26%), unintentional injury (23%) and cancer (17%). In European women, the main causes of alcohol related death are cirrhosis (37%) and cancer (31%). In Ireland the proportion of alcohol related deaths from cancer is higher than the European average, 20.7% for men and 38.8% for women. Cancer incidence due to alcohol was quantified for eight European counties (but not Ireland) as part of the EPIC study. This found 10% of male and 3% of female cancer incidence is attributable to current or former alcohol consumption.

The volume of alcohol consumed in Ireland increased dramatically over the past 50 years. In 1963 average consumption of pure alcohol was 6.2 litres per adult per year. In 2002 consumption reached a peak at 14.2 litres (compared with a European average of 9.1 litres and a global average of 6.1 litres at that time). In 2010 Ireland’s consumption was 6.2 litres per adult per year. In 2002 consumption reached a peak at 14.2 litres (compared with a European average of 9.1 litres and a global average of 6.1 litres at that time). In 2010 Ireland's consumption was reduced to 11.9 litres. While this is now more in line with the European average, it remains a concern especially as one in five is an abstainer. The objective of this study is to calculate the proportion of cancer incidence and cancer mortality in Ireland that was due to alcohol consumption over the ten year period, 2001 to 2010.

Methods
The alcoholic attributable fraction (AAF) is used to estimate the proportion of a condition that is causally related to alcohol. The alcoholic AAF is a function of population age-specific prevalence (P) of alcohol consumption and relative risk (RR) estimates of acquiring a specific alcohol-related cancer, using the formula in Figure 1. AAFs can be applied to national population data on incidence and mortality to determine the number of new cancers and cancer deaths, for a defined time-period, that are causally related to alcohol consumption. Previous research calculated AAFs for all alcohol-related mortality in Ireland. These researchers used alcohol consumption data from the Survey of Lifestyles, Attitudes and Nutrition (SLAN) in 2007 and adjusted it upwards to account for the underestimation by self-reporting. We used their adjusted prevalence data in this study and their consumption categories i.e. abstainer (the reference category), low risk, risky and high risk. Consumption is recorded in grams per day.

A literature review of meta-analyses/systematic reviews identified RRs of specific cancers that are causally related to alcohol. These RRs were applied to the SLAN categorical variables of alcohol consumption in Ireland, Table 1. We obtained national cancer incidence and mortality data, for cancers known to have a causal relationship with alcohol consumption, for the 10 year period 2001-2010. Cancer incidence data were obtained from the National Cancer Registry of Ireland. Cancer mortality data were obtained from the Central Statistics Office. The derived AAFs for each cancer by 5-year age groups for males and females, were collated with cancer incidence and mortality data to determine the number of alcohol attributable cancers in each age group. The total number of new cancer cases and deaths between 2001 and 2010 attributable to alcohol was then calculated, as were the overall proportions attributable to alcohol.

Results
Table 2 shows total 10-year cancer incidence in sites known to be impacted by alcohol and the number (%) calculated as being attributable to alcohol. Table 3 provides the results for cancer mortality attributable to alcohol.

Incidence
Between 2001 and 2010, there were 21,371 invasive cancers diagnosed in men in sites where alcohol is known to play a causative role; 4,585 were attributed to alcohol i.e. 21.5% of all cancers in those sites and 4.7% of all invasive male cancers. The highest proportion of alcohol attributable cancers was seen in the upper aero-digestive tract (lip, oral cavity, pharynx, larynx, oesophagus). Alcohol was considered responsible for 52.9% of male upper aero-digestive tract cancers, in contrast with 6% of colon cancers, 11.8% of rectal cancers and 7% of pancreatic cancers. Alcohol played a causative role in 44.5% of male liver cancers. Between 2001 and 2010, 39,555 invasive cancers were
diagnosed in women in sites where alcohol is known to play a causative role; 4,993 were considered attributable to alcohol 1.6. 11.6% of all the cancers in these specific sites and 4.2% of all female invasive cancers, Table 2. Among females, upper aerodigestive tract cancers were also most impacted, with 866 (35.2%) of the 2,460 cancers of the upper aerodigestive tract attributable to alcohol. Only 3.6% of colon, 7% of rectal and 3% of pancreatic cancers were attributed to alcohol. However, 12.2% of breast cancer and 30% of cases annually, were attributed to alcohol. This accounted for two-thirds of all cancer diagnoses attributable to alcohol in females.

Mortality

Between 2001 and 2010, 6.7% of all male cancer deaths and 4.6% of all female cancer deaths were attributable to alcohol.

The impact on breast cancer is modest in percentage terms, is important at a population level. It is important that women who are at higher risk of breast cancer have information on the additional risk from alcohol. In relation to liver cancer, the EPIC study found that the average proportion of liver cancer incidence due to alcohol, in eight European countries, was 33% for men and 18% for women. The corresponding figure for Ireland was higher at 44.5% for men and 30.7% for women. It is also notable that between 2001 and 2010 recorded liver cancer mortality was higher than liver cancer incidence and the variation was greater in women. One possible hypothesis is that some deaths from metastatic liver cancer may be recorded on death certificates as liver cancer. This warrants further study.

Department of Health alcohol consumption guidelines are 17 units per week for males and 11 units per week for females. The EPIC study showed that 5% of alcohol-related cancer incidence was due to drinking over recommended limits. However there is no threshold of consumption below which there is no risk. Even small volumes of alcohol consumption, within the recommended consumption limits, have been shown to contribute to breast cancer.

There are some limitations in the derivation and application of attributable risk estimates. Firstly, the AAF is dependent on the accuracy of population alcohol consumption data and on the RRs used in the calculations. We used adjusted RR estimates from the EPIC study because it is the largest prospective study on alcohol and cancer. Using adjusted data is in itself limiting as it assumes a symmetrical distribution across consumption categories. Relative risk estimates in the epidemiological literature are, however, broadly similar. Confidence limits associated with these RRs need to be borne in mind but as with other calculations of AAFs, we have not developed methodologies to calculate confidence intervals for each AAF. Therefore there is some uncertainty surrounding the estimate presented. Secondly, the interpretation of attributable risk should be approached with caution, particularly in relation to a multifactorial disease such as cancer. Removal of exposure does not reduce risk to zero in the individual or the population. As such, the burden of cancer from 2001-2010 more accurately reflects patterns of alcohol consumption in the 1980s and 1990s.

Reducing the risk of cancer in Ireland should be a public health priority. A public and health professional information campaign is needed to highlight the risk of alcohol on cancer. This should reinforce that drinking within Department of Health guidelines could prevent half of alcohol-related cancers. It should be noted that many of these cancers were diagnosed in the 1980s and 1990s. As such, the burden of cancer from 2001-2010 more accurately reflects patterns of alcohol consumption in the 1980s and 1990s.

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References


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Correspondence: M Laffey
National Cancer Control Programme, 100 Parnell Street, Dublin 1


