CC/2014/18

COMMITTEE ON CARCINOGENICITY OF CHEMICALS IN FOOD, CONSUMER PRODUCTS AND THE ENVIRONMENT

Calculation of Burden of Cancer Attributable to Alcohol Consumption.

Covering Paper

Members are asked to consider this introductory paper with the aim of deciding how the COC will take forward their calculation of cancer burden attributable to alcohol consumption in 2015.

The Secretariat has identified key areas within exposure assessment, latency and risk exposure period (REP) in the burden estimation, criteria for study selection and determination of the quantitative cancer risk of alcohol consumption, where limitations and/or difficulties exist in the methodology for the estimation of cancer burden attributable to alcohol. Specific questions are posed within each of these sections where input from Members is required.

In addition, the following general questions are posed for Members at the end of the paper:

1) What are Member's views on the issues outlined here and how will the Committee undertake the calculation of burden of cancer?

2) Would it be more appropriate to put together a Burden sub-group of the Committee to facilitate this work?

3) Does the Committee have any further suggestions?

PHE Toxicology Unit/COC Secretariat
October 2014

COMMITTEE ON CARCINOGENICITY OF CHEMICALS IN FOOD, CONSUMER PRODUCTS AND THE ENVIRONMENT

Calculation of Burden of Cancer Attributable to Alcohol Consumption.

Introduction

1) Since November 2013, the COC has been considering the association between alcohol consumption and cancer risk. To date, Members have reviewed alcohol consumption and trends in the UK, pancreatic cancer risk and effect of alcohol cessation on its risk, liver cancer risk and effect of alcohol cessation on its risk, kidney cancer, Hodgkin's lymphoma and non-Hodgkin's lymphoma, and at this meeting female breast cancer and colorectal cancer will also be considered. The Secretariat intends on bringing the remaining sites (oral cavity and the pharynx, larynx, oesophagus) causally associated with alcohol consumption before the Committee in April 2015. At the beginning of these deliberations, it was suggested by Members that following a review of the recently published epidemiological data, calculation of the burden of cancer attributable to alcohol consumption should be undertaken. This introductory paper highlights previous work in the area of cancer burden and alcohol consumption and identifies areas where methodological issues exist in burden estimation with the overall aim of deciding how the COC will take forward their calculation of cancer burden attributable to alcohol consumption in 2015.

2) In the most recent findings for the UK in the Global Burden of Disease (GBD) study (Murray et al., 2013, attached as Annex A), alcohol was the 5th leading risk factor in 2010. The burden of cancer attributable to alcohol consumption has also been previously considered for the UK and European populations (Parkin, 2011; Jones and Bellis, 2013, Schütze et al., 2011, attached as Annex B, C, and D). In 2004, the COC specifically addressed alcohol and breast cancer and concluded that approximately 6% (between 3.2% and 8.8%) of breast cancers reported in the UK each year could be prevented if drinking was reduced to a very low level (i.e. less than 1 unit/week).

How to estimate the burden of disease and calculate the Population Attributable Fraction (PAF)

3) The Population Attributable Risk (PAR) is the proportion of cases that would not have occurred in the absence of a specific risk factor; this attributable fraction (AF) can then be used to estimate attributable numbers of deaths, or newly occurring cancers. There are several methods for estimating the AF but all depend on knowledge of the risk of the disease due to the exposure of interest and the proportion of the target population exposed (Steenland and Armstrong, 2006). The proportion of cancer caused by alcohol consumption is determined in three stages 1) estimation of the exposure distribution to alcohol and 2) establishment of the

appropriate relative risk (RR) associated with each exposure level (dose-response relationship) and 3) calculation of the PAF (Rehm et al., 2010, attached as Annex E).

The most common method of estimating the PAF is to use Levin's equation

$$PAR = P_e (RR_e-1) \ / \ [1 + P_e (RR_e-1)],$$

where P_e is the proportion exposed proportion who drink alcohol and RR_e is the relative risk of disease due to that exposure. This method is appropriate if relative risks are taken from epidemiological studies, with the estimate of the proportion of the population exposed from an independent data source. Jones et al. (2008, attached as Annex F) provide a worked example of how to calculate the attributable fraction.

Key areas and issues identified for calculation of the burden of disease

Exposure assessment

Appropriate data selection of alcohol consumption in the UK

4) The General Lifestyle Survey (GLF or sometimes referred to as the GLS), formerly known as the General Household Survey (GHS), ran from 1971-2012. The GLF survey was a national survey; covering adults aged 16 and over living in private households in the UK and information on the consumption of alcoholic beverages by the UK population was obtained regularly as part of the GLF. The Opinions and Lifestyle Survey (OPN) replaced the GLF in 2012 and is an inter-departmental multi-purpose survey carried out by the Office for National Statistics collecting information on a range of topics from people living in private households in Great Britain. Their first release of data on drinking habits in the UK was in December 2013, and the data are available here: http://www.energy.publicdata.eu/it/dataset/opinions_and_lifestyle_survey/resource/229c6074-f4ce-4b68-a7ec-8cc9c73f5d0c. Data on alcohol consumption in the UK can also be obtained from sources where recorded consumption was calculated (i.e. alcoholic beverages consumed that are recorded in official statistics of production, trade, sales or taxes).

5) Methodology for determining alcohol consumption in populations has a number of limitations. It is generally accepted that surveys underestimate alcohol consumption in interviewees. Members have previously discussed the issue of exposure assessment. Difficulties arise when relying on self-reporting as a source of information on exposure. It is understood that under-reporting is approximately 70% when comparing UK revenue sales from alcohol and self-reporting of alcohol consumption by the public. The Health Survey for England (HSfE) (2011) report similar figures and commented that "*Comparisons of survey measures with HM Revenue and Customs data on alcohol taxed for sale suggest that survey estimates of consumption represent between 55% and 60% of the true figure. However, survey data provide a reliable means of comparing drinking between different groups and of measuring trends in drinking over time".* It is also noted that per capita consumption does not provide data on gender-specific or age-specific consumption estimates.

6) Previous UK studies of Parkin (2011) and Jones and Bellis (2008) have used data from surveys in their calculations of burden of cancer/disease from alcohol consumption. Jones and Bellis (2008) choose data from the GHS as it was the only current source of population estimates that allowed calculation of units of alcohol consumed per week. Parkin (2011) used alcohol consumption data from both the National Diet and Nutrition survey and the GHS. In an attempt to overcome the limitations of both survey and per capita consumption data, Rehm et al. (2007, attached as Annex G) and Rehm et al. (2010, Annex E) has developed methodology to triangulate both average alcohol consumption from surveys and per capita consumption. The methodology involves taking alcohol volume data by sex and age from surveys and overall exposure from per capita consumption data. Meier et al. (2013, attached as Annex H) also addressed this issue of discrepancy between surveys and per capita sales data in a study of oral cancers in Great Britain.

> *Questions for Members on appropriate data selection of alcohol consumption in the UK*
> a) What are Members' views on how best to deal with under-reporting of alcohol consumption for the purposes of our calculations? Sensitivity analysis could be incorporated into the evaluation to investigate the effect of such under-reporting.
> b) What are Members' views on the methodologies of Rehm et al. (2010) and Meier et al. (2013)?

Drinking status

7) Another issue with exposure assessment is addressing the definition of a non-drinker. Some studies defined a non-drinker as someone who currently doesn't drink but this definition does not provide information on whether the individual was a drinker in the past. Others define a non-drinker as an individual who currently doesn't drink and who hasn't consumed alcohol in the past 12 months. This differs from the definition of a never drinker. For the purposes of our analyses, it could be possible to distinguish between these two non-drinking statuses and to categorise individuals as either a) never drinker (currently does not consume alcohol and never consumed alcohol in the past) and b) a former drinker (currently does not consume alcohol but did consumed alcohol in the past) is currently doesn't drink but may have been a drinker in the past. This differs from a never drinker or abstainer.

> *Questions for Members on drinking status?*
> c) How best can the different definitions of a non-drinker be addressed in our calculations?
> d) What is the most appropriate reference category for our deliberations?

Categories of alcohol consumption for dose-response analysis

8) For calculations of burden, Members have previously suggested that a number of alcohol consumption categories should be considered in the analysis. It would be helpful at this point to select the appropriate alcohol categories and for Members to suggest the top dose that should be considered. The dose range may vary by sex depending on the available data.

Questions for Members

e) Would Members suggest an incremental increase of one unit (8g of alcohol) would be appropriate for the dose-response analysis?
f) Do Members have other suggestions?

Latency and Risk exposure period (REP) in the burden estimation

9) The latency period between alcohol consumption and an increased risk of a particular cancer is unknown. For their study on occupational carcinogens, Hutchings and Rushton (2012) defined a risk exposure period (REP), based on cancer latency, as the window of time during which exposure to an occupational carcinogen could result in a cancer being diagnosed or appearing in national mortality or cancer registration record in the estimation year.

Questions for Members

g) What lag-time would Members consider appropriate and would a specific time-period be considered for each of the cancer sites?
h) Considering latency, would alcohol consumption data at the start of this time period or would current intake offer the most appropriate exposure estimate?

Quantitative risk of alcohol

10) It was previously agreed that the ongoing literature review would only consider the cancer sites causally associated with alcohol consumption according to IARC. For the purposes of our calculations, RR estimates and subsequent cancer incidence and mortality data will be limited to these cancer sites. In previous studies investigating the burden of cancer attributable to alcohol, selection of the most appropriate relative risk (RR) was derived from previously published meta-analysis or pooled analysis (Jones and Bellis, 2008; Parkin, 2011). Guidance is needed on how best to select the most appropriate estimate.

Questions for Members

i) Taking into consideration the data from the IARC monographs of 2010 and 2012, the recently updated review papers on the seven cancer sites and the COC's own deliberations on breast cancer in 2004, how do Members wish to select the most appropriate RR'S? For example, should selection be based on the most recent meta-analysis, the meta-analysis with the largest number of studies, only UK relevant studies or studies (cohort or case-control) with Newcastle Ottawa scores > 8 and at least three dose levels?

Data source for cancers statistics

11) The latest available UK cancer statistics are available from the Office of National Statistics (ONS) and currently we have access to 2013 data. This data will offer the most recent cancer incidence data.

Overview Questions for Committee

What are Member's views on the issues outlined here and how will the committee undertake the calculation of burden of cancer?
Would it be more appropriate to put together a Burden sub-group committee to facilitate this work?
Does the Committee have any further suggestions?

PHE Toxicology Unit, Imperial College
October 2014

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