Web Appendix 1

Association of Alcohol Consumption with Weight in Population Studies

Cross sectional studies have shown inconsistent results, although this has been explained in part by gender effects, smoking status and drinking patterns. Lower alcohol intake has been associated with greater BMI in women, but less so, or with the opposite effect, in men [Hellerstedt et al, 1990, Colditz et al, 1991, Breslow & Smothers, 2005]. This effect in men is not consistently seen among male smokers [Mannisto et al, 1996, Cooke & Frost, 1982]. More frequent drinking has been associated with lower BMI independent of total alcohol consumption [Tolstrup et al 2005, Mannisto et al, 1996, Tolstrup et al, 2008].

Prospective studies have demonstrated increasing alcohol consumption over time is not associated with an increase in waist circumference [Tolstrup et al, 2008], but it is associated with weight gain [Gordon & Kannel, 1983], particularly in men [Gordon et al, 1986, Wannamethee & Shaper, 2003]. These studies have not investigated whether the effect is modified by smoking status. Prospective studies in women have found a U shaped curve [Wannamethee et al, 2004] and a significant inverse relationship with weight gain which was not modified by smoking status [Wang et al, 2010].

Three prospective studies (in males and females) have considered the association between alcohol and weight gain around the time of quitting smoking. These three studies found an inverse effect of alcohol consumption and weight gain. One study was a cohort of never-smokers, ex-smokers, current smokers and those who quit during the 2 -4 years follow-up. Cessation of smoking during follow up was positively related to an increase in BMI, whereas alcohol consumption was negatively associated with gain in BMI. There was no evidence of effect modification by smoking status. However smoking status was self reported and quitting date was variable (any time after study entry), so a smaller weight gain may have diluted the results. That study may also have lacked power to detect an effect modification because there were only 65 quitters and alcohol consumption was a binary variable [Froom et al, 1999]. The second study, a 2 year cohort, found a small but significant inverse association between alcohol consumption measured at study entry and subsequent weight gain in a group of women who quit or continued smoking during this time. This association was seen after adjustment for physical activity [Kawachi et al 1996]. There was no investigation of interaction by smoking status. Abstinence was measured by point prevalence which may have underestimated weight gain and accounted for the small effect size. The third study was the Lung Health Study which followed biochemically validated continuous abstainers for 5 years [Nides et al, 1994]. The data showed that for each standard US drink per week consumed at baseline, the regression coefficient was -0.098 ($p=0.02$) in men and -0.234 ($p=0.02$) in women. (Although the study team reported these coefficients separately for each gender, there is no statistically significant difference between them according to our calculations). Equating these to UK units gave regression coefficients of -0.083 and -0.132 for men and women respectively. The Lung Health Study also measured self reported alcohol consumption at baseline only and did not measure or adjust for physical activity or diet.

Thus there is consistent epidemiological evidence that alcohol consumption is associated with lower weight gain in people who stop smoking. We have been unable to find contrary evidence. We found no evidence that the association between alcohol consumption and weight gain depended upon gender despite epidemiological evidence in the general population suggesting that gender modifies the association between alcohol and weight gain. However it may be that the effect in quitting smokers is stronger than in the population as a whole and as such the gender differences become negligible.

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