

Implications for practice and research

- Daily e-cigarette users are more likely to reduce and attempt to quit tobacco smoking than non-users, but are no more likely to report abstinence.
- Improved measurement of e-cigarette use in future observational studies will improve our understanding of the relationship between e-cigarettes and smoking cessation.

Context

In the UK, peak increases in e-cigarette usage from 2013 to 2014¹ correspond broadly with a national increase in cessation of tobacco.² An important question is whether e-cigarette use may cause a reduction in smoking. Brose and colleagues sought to address a key element of this question: whether e-cigarette use is associated with subsequent smoking cessation behaviour? Longitudinal studies prior to this one have found that e-cigarette users are no more likely to be abstinent at follow-up than non-users. Brose and colleagues improve on a key limitation of these studies by distinguishing between daily and non-daily e-cigarette users.

Methods

The study was a web-based longitudinal survey using an online panel recruited by a market research organisation. After screening for smoking behaviour, 4064 smokers completed the baseline survey and 1759 (43%) completed the 1 year follow-up survey. Key outcome measures at follow-up were the number of quit attempts made in the previous year, self-reported smoking status (smoker vs ex-smoker) and the number of cigarettes smoked per day used to calculate reduction ($\leq 50\%$ of baseline cigarettes per day). Participants were split into daily users, non-daily users and non-users of e-cigarettes at baseline and regression analysis (unadjusted and adjusted for several potential confounders) was used to identify between-group differences in quit attempts, cessation and reduction at follow-up.

Findings

Approximately one-third of the sample had ever used e-cigarettes and one-fifth was currently using them at baseline. Adjusted analyses found that daily e-cigarette users were significantly more likely than non-users to have attempted to quit (65% vs 44%) and reduce their smoking (14% vs 6%) at follow-up. However, there were no statistically significant differences between daily users and non-users in cessation of tobacco (8% vs 13%). There were no significant differences in smoking outcomes between non-daily e-cigarette users and non-users in any of the adjusted analyses.

Commentary

As with a number of prior longitudinal studies, Brose and colleagues found that e-cigarette users were no more likely to quit smoking than non-users, despite differences in cessation-related activity. In fact, the direction of effect for cessation in this study, although not statistically significant, is in the opposite direction to what might be expected. This is at odds with a review of two randomised controlled trials (RCTs) supporting the efficacy of e-cigarettes³ and a recent observational study finding daily use of e-cigarettes for at least one-month, measured retrospectively, was strongly associated with subsequent cessation compared to non-regular or non-use.⁴ Several limitations in design and measurement may explain these seemingly contradictory findings. Unlike the random allocation of an RCT, smokers in this study had chosen to use e-cigarettes or not. This choice could

have hidden unmeasured confounders. For example, one-third of smokers report using e-cigarettes to reduce smoking but do not stop entirely.¹ This substantial minority of e-cigarette users are likely to have lower intentions to cease tobacco use compared to non-users, as found elsewhere among intermittent e-cigarette users.⁴ A further limitation concerns the cross-sectional measurement of e-cigarette use at baseline only. However, a potentially more important factor has recently emerged; the type of e-cigarette used. The authors describe elsewhere how most users chose first generation devices, which deliver lower nicotine levels than more sophisticated tank devices.⁵ When the analyses were restricted to tank users they found abstinence at follow-up was significantly higher compared to non-users.⁵ This is supported by survey data showing that among e-cigarette users, tanks are used more by ex-smokers than continuing smokers.¹ However, this study was not designed to answer the critical question emerging: is the observed relationship between type of e-cigarette used and smoking cessation causal or is it confounded by characteristics connected to choice? Ongoing RCTs will likely answer this question soon.