Reviewer's report

Title: Household smoking and dental caries in schoolchildren: the Ryukyus Child Health Study

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Reviewer: Scott L. Tomar

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This cross-sectional study examines the association between exposure to environmental tobacco smoke (ETS) and dental caries in a large sample (20,000) of schoolchildren in Japan. It found that household smoking was positively associated with the number of decayed primary or permanent teeth, with evidence of a dose-dependent association. The authors conclude that SHS exposure was independently associated with an increased prevalence of dental caries.

General Comments

This paper is generally well written and the study is based on large, representative sample of schoolchildren aged 6–15 years in 2 cities in Okinawa, Japan.

The major concern with this study is that even extremely small associations achieve “statistical significance” when the sample is very large. The adjusted prevalence ratio estimates are all very modest (1.03–1.11), even if their associated 95% confidence intervals exclude 1.0. The prevalence of decayed and/or filled teeth differs by less than 6 percentage points between those children never exposed to smoking in the house and those currently exposed to 15 or more cigarettes per day. Similarly, the mean number of affected teeth ranged from 4.1 in the never exposed group to 4.5 in the most heavily exposed group, although the p-value of <.0001 suggests a strong dose-response association.

One potential explanation for the “significant” associations may be uncontrolled confounding. In particular, smoking appears to be strongly associated with socioeconomic status in Japan [Fukada et al. Socioeconomic pattern of smoking in Japan: income inequality and gender and age differences. Ann Epidemiol. 2005;15(5):365-72]. The only marker for SES in this study was maternal and paternal educational attainment, collapsed into 4 categories each. Virtually all parameter estimates in this study were attenuated when adjusted for potential confounders, and for the “strongest” associations such as ETS and decayed teeth, the degree of attenuation was greater than the remaining degree association. For example, the crude prevalence ratio for current #15 cpd of 1.29 was reduced to 1.11 after controlling for potential confounders. This pattern suggests the crude associations were largely explained by confounding, and residual confounding due to relatively crude measures for confounding variables could account for the remaining modest but statistically significant association.
Consistent with that explanation, the present study found an association between ETS and decayed teeth, but not filled teeth. %D/DMFT is used as a measure of unmet treatment needs, and generally is higher for population with reduced access or utilization of dental care and is also strongly associated with SES. In the present study, %D/DMFT for those never exposed to SHS was 1.4/4.1 = 34%, while for those most heavily exposed it was 1.8/4.5 = 40%. At least some of the difference in prevalence of decayed teeth may have been due to SES factors unrelated to ETS exposure.

There have been a few other cross-sectional studies that similarly reported modest degrees of association between ETS exposure and dental caries, so this study adds to that limited body of literature. However, the preponderance of evidence finds no association between active smoking and dental caries (see, e.g., the 2004 U.S. Surgeon General’s Report on the Health Consequence of Smoking). It seems counterintuitive that ETS would increase the risk for dental caries but active smoking does not.

Specific comments
1. p5. It is unclear how accurate these measures of household smoking might be. For elementary school students, the parents complete the questionnaire, and presumably could give reasonable answers on the number of cigarettes they smoke per day and age at which they started. But junior high school students completed at least some of these questionnaires themselves; is there evidence that children 12–15 can provide accurate answers to those questions? In addition, it is not clear whether the number of cigarettes per day refers to the number actually smoked in the household (as is suggested in e footnote to Table 2) or the total number smoked per day by one or more smokers who live in the household (as is suggested in the description of the questionnaire). If it is the latter, many of those cigarettes may actually be smoked outside of the household. Exactly what were the questions asked concerning smoking?
2. p. 5. How was pack-years of smoking handled in the analysis if it was greater that the child’s age?
3. p. 6. If 42% of children were exposed to ETS in the household and half were not, who were the other 8%?
4. p. 8. The discussion section cites two studies on the association between active smoking and salivary factors or bacterial counts, but does not mention that most epidemiologic studies found no association between active smoking and caries.

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.
Declaration of competing interests:

I serve as an expert witness for the plaintiff in a lawsuit against a cigarette manufacturer related to oral health effects of smoking.