

Periodontal Disease and Breast Cancer—Letter

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Freudenheim and colleagues report that periodontal disease was associated with increased risk of postmenopausal breast cancer, particularly among former smokers who quit in the past 20 years (1). We have corroborated these results using oral health data from The Behavioral Risk Factor Surveillance System (BRFSS).

We used age-adjusted breast cancer death rates per 100,000 in 50 U.S. states and the District of Columbia 2003–2007 from the American Cancer Society (2). Percent of adults ages 65+ who have lost 6 or more teeth due to tooth decay or gum disease are from BRFSS 2008, the U.S. Centers for Disease Control and Prevention survey, which tracks health risks in the United States (www.cdc.gov/brfss). State adult obesity data are from the U.S. Centers for Disease Control and Prevention (www.cdc.gov). State population and income data are from the U.S. Census (www.census.gov).

We found a highly significant correlation between breast cancer death rate and percent of adults ages 65+ who have lost 6 or more teeth due to tooth decay or gum disease ($r = 0.527$, $P < 0.001$; Fig. 1).

Breast cancer survival diminishes with obesity (3) and is considered to be a disease of affluence (4). We used the univariate general linear model with breast cancer death rates as dependent variable, tooth loss, obesity, and income as covariates. We weighted the analysis by state population, so that a populous state such as California (38,800,000 population) would have more weight than a less populous state, such as Wyoming (population 544,270). The effect of tooth loss on breast cancer death rate was significant ($F = 28.4$, $P < 0.001$) and independent of the effects of adult obesity ($F = 12.2$, $P = 0.001$) and income ($F = 21.3$, $P < 0.001$).

A weakness in our analysis is possible confounding by the ecological fallacy (or ecological inference fallacy), a logical fallacy

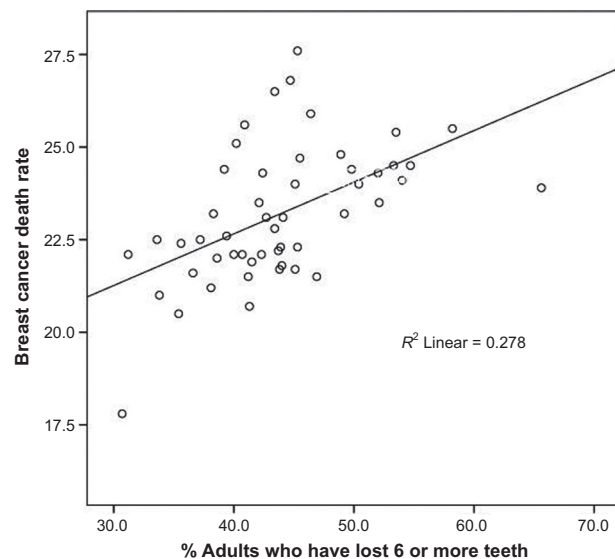


Figure 1.

Age-adjusted breast cancer death rate per 100,000 in 50 U.S. states and the District of Columbia 2003–2007 versus percent of adults ages 65+ who have lost 6 or more teeth.

in the interpretation of statistical data where inferences about the nature of individuals are derived from inference for the group to which those individuals belong (5). In this case, inferences about individuals are being drawn from the characteristics of U.S. states where they reside, rather than from the individuals themselves.

Poor oral health has already been linked to coronary heart disease (6), Alzheimer disease (7), and cancer (1). A clearer insight into the entire process could be of value in understanding the etiology of breast cancer.

Disclosure of Potential Conflicts of Interest

No potential conflicts of interest were disclosed.

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References

- Freudenheim JL, Genco RJ, LaMonte MJ, Millen AE, Hovey KM, Mai X, et al. Periodontal disease and breast cancer: prospective cohort study of postmenopausal women. *Cancer Epidemiol Biomarkers Prev* 2016;25:43–50.
- American Cancer Society. *Cancer facts and figures*. Atlanta, GA: American Cancer Society; 2013. p. 1–68.
- Protani M, Coory M, Martin JH. Effect of obesity on survival of women with breast cancer: systematic review and meta-analysis. *Breast Cancer Res Treat* 2010;123:627–35.
- Krieger N. Is breast cancer a disease of affluence, poverty, or both? The case of African American women. *Am J Public Health* 2002;92:611–3.
- Schwartz S. The fallacy of the ecological fallacy: the potential misuse of a concept and the consequences. *Am J Public Health* 1994;84:819–24.
- DeStefano F, Anda RF, Kahn HS, Williamson DF, Russell CM. Dental disease and risk of coronary heart disease and mortality. *BMJ* 1993;306:688–91.
- Poole S, Singhrao SK, Kesavalu L, Curtis MA, Crean SJ. Determining the presence of periodontopathic virulence factors in short-term postmortem Alzheimer's disease brain tissue. *J Alzheimers Dis* 2013;36:665–77.