

HAIR NICOTINE AS A BIOMARKER FOR EXPOSURE TO SECONDHAND SMOKE

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Purpose: This study assessed the validity of using hair nicotine as a biomarker to determine secondhand smoke (SHS) exposure among a sample of bar and restaurant workers. Biomarkers that have been used to measure tobacco smoke exposure such as urine cotinine, expired air carbon monoxide, and thiocyanate have a relatively short half-life in blood or urine samples. However, nicotine levels in hair measure up to several months of cumulative tobacco smoke exposure, providing an important measure of long-term nicotine exposure.

Method: Hair samples were obtained from 107 participants after they reported to a local health department and completed a 10-15 minute survey questionnaire. Self-reported tobacco use and sources of SHS (work, home, car/truck, other) were assessed. Hair was collected by trained health department staff by cutting 10- 50 mg of hair from the back of the scalp. Hair samples were analyzed using the reversed-phase high performance liquid chromatography with electrochemical detection (HPLC-ECD) method.

Findings: There was a significant difference in hair nicotine levels between nonsmokers and smokers ($t = -4.14$, $p < .0001$). Post hoc analysis using Fisher's least significant difference test (LSD) showed significant differences in hair nicotine levels between individuals exposed to 3 or more sources of SHS exposure and no source ($p < .05$), one source ($p < .01$), and two sources of exposure ($p < .01$). Results of the regression analysis produced a significant, albeit weak model (adjusted $R^2 = .17$, $F = 6.97$ $p = .002$) that included only two variables: number of sources of exposure and regular exposure other than work, home, and car/truck. The number of sources of exposure alone explained 10% ($p < .01$) of the variance in predicting hair nicotine levels. The addition of regular sources of exposure outside of work, home or car/truck explained another 8% in variance.

Discussion: Since chronic exposure to SHS is associated with adverse health outcomes, it is important to use valid objective measures of exposure in future research. Hair nicotine may be a novel and inexpensive method of measuring chronic exposure to SHS. More research is needed to better quantify the duration of SHS exposure using hair nicotine.