

Evaluating Oral Fluid as a Screening Tool for Lead Poisoning

S Lynn Gardner¹, Robert J Geller¹, Anil T Mangla², Robyn Hannigan³, Yu Sun², Forrest Staley²¹Emory University Dept of Pediatrics, Atlanta GA USA²GA Dept of Public Health, Atlanta GA USA³University of Massachusetts, Boston MA USA

Background: Many parents prefer not to have their children's blood drawn to be tested for lead. The use of other less invasive methods for screening environmental lead exposure may increase the screening rate for childhood lead poisoning. Oral fluid refers to the liquid normally present in the region of the oral cavity anterior to the teeth and gum line. While oral fluid usually contains some saliva, the small amount of saliva is mixed with gingival crevicular fluid and other secretions from the mucosal surfaces of the cheek and gums. Thus, oral fluid is more similar to an ultrafiltrate of the plasma than common saliva. Sialochemistry for environmental heavy metals may be useful for screening exposure to lead, but has not been evaluated in an actual clinical setting for this purpose.

Objective: To evaluate the correlation of oral fluid and venous blood lead in a clinical setting.

Methods: Oral fluid samples were collected on 500 children aged 6 months to 5 years in a primary care clinic. Children due to have blood lead levels drawn at their well child check visit were eligible. Oral fluid samples from 50 children were gathered twice to provide internal controls, but were counted once. Blood was obtained by venipuncture. Data analysis used Pearson correlations, scatter plots and linear regression. The mean absolute difference between the sample groups was determined to test the hypothesis that group means are equal ($\alpha=0.05$).

Results: 500 patients agreed to enroll in this study. 474 patients had both venous blood and oral fluid samples available for analysis; 25 patients did not have blood available and 1 oral fluid sample was unacceptable. 455 patients had both oral fluid and venous blood lead levels $<4 \mu\text{g/dL}$, and 19 had both oral fluid and venous blood lead levels $\geq 4 \mu\text{g/dL}$. All oral fluid levels $<4 \mu\text{g/dL}$ correlated with a venous blood level $<4 \mu\text{g/dL}$, $p < 0.05$. Internal controls suggested no variations, $p > 0.05$.

Conclusions: Oral fluid appears to be a reliable medium to use when screening children for lead exposure at levels $<4 \mu\text{g/dL}$. Oral fluid lead levels $\geq 4 \mu\text{g/dL}$ should be confirmed by a venous blood sample. The convenience of lead screening by measurement of oral fluid should improve our screening success by reducing parental refusal and eliminating inability to obtain an adequate blood sample.