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**Title:** Lung function decrement with arsenic exposure to drinking groundwater along river Indus: A comparative cross-sectional study

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**Body:** Objective To determine the association between chronic arsenic exposure through drinking groundwater and decrement in lung function among adult individuals who do not have signs of arsenic lesions. Methods Comparative cross-sectional study during January to March 2009. 100 participant >15 years of age in each group i.e. exposed (>100 ug/L) and unexposed (< 10 ug/L) to arsenic, determined by testing drinking water samples, were compared for effects on lung function using spirometry. A validated questionnaire was administered. Results There was a decline in mean adjusted FEV1 of 154.3 ml (95 percent CI: -324.7, 16.0; p = 0.076), in mean adjusted FVC of 221.9 ml (95 percent CI: -419.5, -24.3; p = 0.028), and in FEV1/FVC ratio of 2.0 (95 percent CI: -25.3, 29.4; p = 0.884), among participants who were exposed to arsenic compared to unexposed. A separate model comprising a total of 160 participants, 60 exposed at arsenic concentration of >250 ug/L and 100 unexposed at arsenic concentration of < 10 ug/L showed a decrement in mean adjusted FEV1 of 226.4 ml (95 percent CI: -430.4, -22.4; p = 0.030), in mean adjusted FVC of 354.8 ml (95 percent CI: -583.6, -126.0; p = 0.003), and in FEV1/FVC ratio of 9.9 (95 percent CI: -21.8, 41.6; p = 0.539), among participants who were exposed to arsenic in drinking groundwater. Conclusion This study demonstrated that decrement in lung function is associated with chronic exposure to arsenic in drinking groundwater, occurring independently, and even before any manifestation, of arsenic skin lesions or respiratory symptoms. The study also demonstrated a dose-response effect of arsenic exposure and lung function decrement.