Cross-Sectional and Prospective Study of Lung Function in Adults with Diabetes Mellitus

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Although several studies suggest that diabetics have lower lung function than non-diabetics, most studies are limited due to the small sample size, and lack of prospective data. Therefore, we analyzed pulmonary function data from the Atherosclerosis Risk in Communities (ARIC) Study, a population-based study of adults aged 45-64 years. Measurement of forced vital capacity (FVC) and forced expiratory volume in one-second (FEV1) were available at the baseline and at the 3-year follow-up visit for 11,365 individuals without underlying lung diseases. At baseline, 1,187 (9%) individuals had diabetes defined as a physician diagnosis of diabetes, use of diabetic medications, a fasting glucose >= 126 mg/dL, and/or non-fasting glucose >=200 mg/dL. At baseline, compared to non-diabetics, diabetic adults had lower age-, sex-, race-, and height-adjusted FVC (3.5 vs 3.7 L; p< 0.01) and FEV1 (2.6 vs 2.9 L; p< 0.01). These differences remained significant after further adjustment for adiposity, pack-years of smoking, physical activity, education, and co-existing cardiovascular diseases. There was a significant, and graded relationship between FVC and hyperglycemia. Compare to individuals with fasting glucose level <=97 mg/dL, adults with fasting glucose levels of 98-109, 110-125, 126-170, and 170+, had FVCs that were lower by 19mL [95%CI: -1.3 to 40 mL], 61mL [26 - 90 mL], 159 mL [114 - 205 mL], and 187mL [134 - 240 mL], respectively. A similar dose-response relationship was also observed between FEV1 and fasting glucose levels. In prospective analysis, FVC declined more rapidly in diabetics compared to non-diabetics (difference = (mL/year; 95% CI, 1.3 - 11.2 mL/year). In contrast, diabetes was not associated with a lower FEV1/FVC ratio either at baseline or during follow-up. The results of this study show that diabetes is independently associated with a decrement in lung function consistent with a restrictive ventilatory process. The ARIC study supports the notion that the lung is a possible target organ for diabetes-related complications.