Title: Relationships among green space, ambient fine particulate matter, and cancer incidence in Taiwan

Abstract

Green space and air pollution have been recognized as vital health determinants. There is a paucity of studies examining the interplay between green space, fine particulate matter (PM2.5), and the incidence of specific cancers. We aimed to explore the contributions of green space and ambient PM2.5 to the risk of specific cancers in terms of the most common cancers based on incidence or mortality rate in Taiwan and to ascertain the interaction between green space and PM2.5 and their role in cancer risk. This retrospective longitudinal cohort study included 407,415 participants. Data were obtained from the 2000–2015 MJ Health Examination Database linked to the Taiwan Cancer Registry and Causes of Death datasets. All participants were aged ≥20 years and had no history of cancer. The environmental exposure were the normalized difference vegetation index (NDVI) and the 2-year average PM2.5 at baseline. Multivariate adjusted hazard ratios (HRs) were calculated using Cox proportional hazards models. We adjusted for covariates including demographics, anthropometrics, comorbidities, health behaviors, biochemical data, and environmental factors. During a median follow-up of 10.37 years, 11,576 cancer cases were reported. PM2.5 exposure increased the risk of all cancers (HR: 1.11, [95% CI: 1.06–1.15]), stomach cancer (HR: 1.27, [1.02–1.58]), endocrine gland cancer (HR: 2.13, [1.39–3.26]), breast cancer (HR: 1.12, [1.03–1.22]), and lung cancer (HR: 1.12, [1.01–1.24]). An increase in NDVI reduced the risk of prostate cancer (HR: 0.93, [0.88–0.99]) and lung cancer (HR: 0.95, [0.91–0.99]). NDVI influenced the incidence of prostate and all cancers by reducing PM2.5 concentrations. Long-term PM2.5 exposure is associated with an increased risk of some types of cancers. In contrast, an increase in environmental green space exposure is associated with lowering of the risk of prostate and lung cancer.