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ACUTE EFFECTS OF EXPOSURE TO NOISE AND AIR POLLUTANTS ON 24-HOUR AMBULATORY BLOOD PRESSURE IN ADULTS

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Background Exposure to road traffic noise, particulate matter with aerodynamic diameter less than 2.5 micrometer (PM2.5) or nitrogen oxides (NOx) was associated with the elevation of blood pressure, but their combined effects were not clear.

Objectives This repeated-measures study investigated the single and combined effects of noise, PM2.5 and NOx on 24-hour ambulatory blood pressure.

Methods We recruited 33 males and 33 females aged 18-32 years as study subjects. Individual noise exposure and personal blood pressure were measured simultaneously in 2007. During the periods, 24-hour data of PM2.5 and NOx from five air-quality monitors within 3 km at home addresses were used to estimate individual exposure. The linear mixed-effects regression models were applied to estimate effects on blood pressure after controlling for potential confounders.

Results Exposure to either noise or PM2.5 was significantly associated with the increases of systolic blood pressure (SBP) and diastolic blood pressure (DBP) over 24 hours. This association was not found significantly between NOx and blood pressure. Combined exposure to noise and PM2.5 had the greater elevations of 0.12 (95% CI: 0.05-0.18) mmHg in SBP and 0.16 (95% CI: 0.11-0.20) mmHg in DBP compared with either single exposure. Such effects on SBP and DBP still persisted at the 1-hour and 2-hour time-lagged exposure over 24 hours.

Conclusions These findings suggest that combined exposure to noise and PM2.5 may have the greater effects than single exposure on SBP and DBP. Future epidemiological studies should consider both exposures to investigate the possible cardiovascular effects.

Keywords: Blood pressure, fine particle, hypertension, nitrogen oxides, noise.