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**Association between long-term ambient air pollution exposure on handgrip strength change in the French CONSTANCES cohort**

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**ABSTRACT**

BACKGROUND AND AIM - Literature is scarce regarding the effect of exposure to outdoor air pollution on frailty. In this longitudinal study, we aimed to assess the association between long-term air pollution exposure and handgrip muscle strength (HGS) change, a marker of frailty. METHODS - Data from the 45-69 years-old population of the French CONSTANCES cohort with two HGS measurements were used. Annual mean concentrations of PM<sub>2.5</sub>, black carbon (BC), and NO<sub>2</sub> were estimated using 2010 land-use regression models at the residential addresses of the participants at enrolment (2014-2016). Absolute change in maximum HGS (HGS<sub>max</sub>) between enrolment and follow-up (around 4.5yrs after) was used as the outcome and decline was defined as a negative absolute change in HGS<sub>max</sub>. Sex-stratified multilevel adjusted (including length of follow-up) linear regressions with the center of recruitment as a random effect and sandwich robust error were used (reported as adjusted  $\beta$ , and 95% confidence interval [CI] for an interquartile range increase in exposure). RESULTS - Among the 4655 included participants, 50% (N=2331) were women, mean age was 57 years old, and 54% had a high educational level. Average HGS<sub>max</sub> at baseline was higher among men than women (45.1 vs 27.6 kg). Around 60% had a decline in HGS<sub>max</sub> between the two measurements and decline was higher in men (median[Q1;Q3]=-2[-5;2]) than in women (-1[-3.5;1]). Preliminary results showed that exposure to BC was associated with HGS decline in women ( $\beta$ [95%CI]: -0.33[-0.62;-0.05]), but not in men (-0.17[-0.60;0.25]). Further adjusting on urbanity led to similar effect sizes, but results among women were no longer statistically significant. Results for PM<sub>2.5</sub> and NO<sub>2</sub> were similar to the ones for BC. CONCLUSIONS - Long-term exposure to ambient air pollution is associated with HGS decline in women, with urbanity as a possible confounding factor.

**KEYWORDS:** Handgrip strength; Aging; Air pollution; Particulate matter; Frailty

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