Traffic can be responsible for different respiratory adverse effects in schoolchildren. A prospective study in Milan, Italy

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Recent studies outlined the possibility of important adverse effects of children health due to air pollutants. In particular, traffic related pollution adversely affects lung function development (Gauderman, 2007).

Two-hundreds and twenty-eight children (127 males and 101 females), mean age 8 years, were enrolled from 2 primary schools, which were located in different sites, for studying pollution related respiratory symptoms and/or diseases in different places of Milan with a different traffic related exposure. The former (School 1) was located near a large park, the latter was located downtown, close to main crossroads (School 2). Daily levels of PM10 and PM 2,5 (diameter < 10 µm and 2,5 µm, respectively) were measured using a mobile detection unit, which was placed either outside the schools (in the school garden) and within common places (corridors), for 7 consecutive days during 2 different campaigns (winter and spring-summer). Children underwent skin prick testing for inhaled allergens, analysis of exhaled nitric oxid FeNO and spirometry.

The distribution of FeNO values was significantly different (p=0,02) between the two schools. In particular, the percentage of children with FeNO values <5 ppb in school 1 was higher (almost double) than in school 2. In 73% of children attending the school located downtown FeNO concentration was between 5 e 20 ppb. This difference, even if within normal values, could reflect a major bronchial eosinophilic inflammation in children exposed to higher concentration of pollutants.

The percentage of asthma exacerbations in the previous 12 months was higher in children from school 2 (p=0.05). On the contrary, the prevalence of persistent allergic rhinitis in children allergic to grass pollen was higher in school 1 (p=0.03). In particular, the latter children also had a greater activity limitation, due to rhinitis and concomitant conjunctivitis (p=0.03).

Interestingly, the highest recorded peak for PM10 occurred between 8,15 and 8,45 in the morning, for 3 consecutive days, and was strictly related to activities concomitant with children arrival. This peak (up to 1000 $\mu g/m^3$) didn’t seem to produce specific health effects, likely because of the usual PM10 composition in a park site, with a very low content of toxic or reactive components.

In conclusion, symptoms and hospital admissions because of lower respiratory tract diseases (bronchitis, bronchiolitis, pneumonia) were more frequent during the winter campaign and in school 2, located downtown, whereas otitis and allergic rhinitis or conjunctivitis, together with asthma, were more severe during the spring-summer period and in school 1, located near the park (p < 0,05).

Present continuous on field monitoring of the various types of PM clearly shows that:

- short lasting pollution peaks, even reaching concentrations 20 folds above the fixed limits, have no consequences on children health and are easily induced by children themselves, only because of their arrival or movement. They cannot be eliminated, by restriction policies, because they are due to the very presence of the human beings who should be protected.
- these high peaks are going to recur at the same time in consecutive days and are then related to easily detectable factors.
- there is an enormous daily variability, in PM10 concentration among the various hours of the day, and the daily mean value results from the average of values with a very high standard deviation (+30,+1000 $\mu g/m^3$) and include various peaks.

Present findings show that, on the basis of the distribution of FeNO values, different degrees of respiratory function and bronchial inflammation were found in the 2 groups of children. Even if great caution is required when relating data from air quality monitoring to clinical outcomes in humans, it can be inferred that: 1) the different air quality in the 2 schools could have a role in determining observed differences; 2) traffic could be, at least in part, responsible for the different air quality; 3) reduction of traffic related pollution should be a logical and suitable objective of policy makers.

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