A study of the acute effects of household air pollution on blood pressure in Indian women

Air pollution, and especially indoor air pollution from burning highly polluting solid fuels such as wood, crop residues, and coal, has intuitive and well-documented relationships with respiratory health. In recent years, many studies have also shown relationships between exposure to air pollution and cardiovascular health but our understanding of the mechanisms driving these relationships is limited. In addition, there are relatively few studies that have used personal monitoring of air pollution exposures, which account for differences in the air pollution exposures experienced by individuals rather than assigning a single pollution value to all participants within an area (i.e., the same household or city), to address associations with cardiovascular health. Having a more complete understanding of how exposure to air pollution may be affecting cardiovascular health would allow us to implement better policies to protect the health of individuals exposed to air pollution.

In this study, we recruited 45 women in rural Hire Waddarkal village, India, who cooked with highly polluting wood fuels in basic cookstoves or open fires. We outfitted each woman with a small device to monitor her minute-by-minute exposure to black carbon, a product of incomplete combustion, during a cook session. Our aim was to examine the exposures of these women over the duration of the cook session and to determine if these exposures were related to changes in blood pressure during the same cook session. To measure blood pressure, during the same cook session in which we were measuring a woman's exposures we had participants wear a cuff that automatically recorded blood pressure measurements every 10 minutes. We collected other information that might relate to air pollution exposures and their relationship with blood pressure by observing and recording activities the women engaged in during the cook session (i.e., sweeping, cutting vegetables, pounding roti) and by conducting a household survey at the beginning of the study. We collected data during 2 seasons – the summer and the winter.

We found that these women were exposed to very high levels of black carbon while cooking, and that there may be an association between exposures and a small increase in systolic blood pressure that is observable within less than 20 minutes of exposure to black carbon. We know that increases in blood pressure are a risk factor for cardiovascular events. Given the number of people that continue to cook with these highly polluting fuels on a daily basis worldwide, even a small increase in blood pressure such as the one observed in our study can lead to an important increase in the risk of cardiovascular events.

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A panel study of the acute effects of personal exposure to household air pollution on ambulatory blood pressure in rural Indian women.

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