

## Air pollution linked to poorer quality sperm

*..And might spell infertility for “significant number of couples,” say researchers*

Air pollution, particularly levels of fine particulate matter (PM<sub>2.5</sub>), is associated with poorer quality sperm, suggests research published online in ***Occupational & Environmental Medicine***.

Although the size of the effect is relatively small in clinical terms, given how widespread air pollution is, this might spell infertility for a “significant number of couples,” say the researchers.

Environmental exposure to chemicals is thought to be a potential factor in worsening sperm quality, but the jury is still out on whether air pollution might also have a role.

To explore this possibility further, the international team of researchers looked at the impact on health of short and long term exposure to fine particulate matter (PM<sub>2.5</sub>) among nearly 6500 15 to 49 year old men in Taiwan.

The men were all taking part in a standard medical examination programme between 2001 and 2014, during which their sperm quality was assessed (total numbers, shape/size, movement) as set out by World Health Organization guidelines.

PM<sub>2.5</sub> levels were estimated for each man’s home address for a period of three months, as that is how long it takes for sperm to be generated, and for an average of 2 years, using a new mathematical approach combined with NASA satellite data.

A strong association between PM<sub>2.5</sub> exposure and abnormal sperm shape was found. Every 5 ug/m<sup>3</sup> increase in fine particulate matter across the 2 year average was associated with a significant drop in normal sperm shape/size of 1.29 per cent.

And it was associated with a 26 per cent heightened risk of being in the bottom 10 per cent of normal sperm size and shape, after taking account of potentially influential factors, such as smoking and drinking, age or overweight.

However, it was also associated with a significant increase in sperm numbers, possibly as a compensatory mechanism to combat the detrimental effects on shape and size, suggest the researchers.

Similar findings were evident after three months of exposure to PM<sub>2.5</sub>.

This is an observational study so no firm conclusions can be drawn about cause and effect, and the researchers were not privy to information on any previous fertility problems.

And exactly how air pollution could impair sperm development is not clear. But many of the components of fine particulate matter, such as heavy metals and polycyclic aromatic hydrocarbons, have been linked to sperm damage in experimental studies, the researchers point out.

Free radical damage, brought on by exposure to air pollutants, might have a possible role, as this can damage DNA and alter cellular processes in the body, they suggest.

“Although the effect estimates are small and the significance might be negligible in a clinical setting, this is an important public health challenge,” emphasise the researchers.

“Given the ubiquity of exposure to air pollution, a small effect size of  $PM_{2.5}$  on sperm normal morphology may result in a significant number of couples with infertility,” they warn, calling for global strategies to minimise the impact of air pollution on reproductive health.